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CHICAGO, APRIL 1913.

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WIND, SLEET AND FLOOD.

WITHOUT having consulted a competent astrologer, we cannot but surmise that Mars and Saturn are in close aspect to Earth—or whatever planetary combination it is that presages war and disaster. The turmoil and dissension in Europe and Mexico, while providing the war part of the program in good shape, have not seriously affected our own intimate industry. But as to disaster—seldom has this country witnessed so much wide-spread trouble resulting from the unruliness of the elements.

Amid scenes of destruction by wind and flood, when acts of heroism are so common as almost to pall upon the mind, it seems akin to class egotism to refer to the special bravery of the telephone women and men. We are, indeed, accustomed to seeing operators stick to their switchboards until escape is impossible and they are martyred to the safety of others. We take it as a matter of course when linemen and their chiefs work continuously, with almost superhuman energy, until they drop exhausted after days and nights of straining, panting struggle in a chaos of wreckage. Perhaps it does not even occur to us that they are doing more than duty; they are working for an Employer greater than their company, and they will be paid in a higher coin.

From the flood-devastated areas of Ohio and Indiana and from the danger lines along all the rivers of the middle states are coming reports of the devotion of the operators—not merely to their work, but to their public—the people that bully them and browbeat them and villify them when they do only their duty. And those reports will continue to come until every stricken community has been canvassed. It is idle to attempt to catalogue examples of individual heroism, for they have been the rule rather than the exception during those strenuous days so recently passed.

From another standpoint we are confronted by the physical aspect of the perishable portions of telephone construction. The photographs we present elsewhere of the ravages of wind and sleet show plainly enough what damage may come to open wire leads even in localities where the storm itself was not extraordinarily violent. The only inconsistency is the Omaha picture, wherein a joint pole of the telephone and electric light systems is shown standing erect and apparently unharmed amidst the prostrate wrecks of buildings and fences.

Some of these photographs are almost beautiful in their scenes of picturesque ruin and desolation. One of the peculiarities of the human mind is that it seems to derive a grim pleasure from evidences of its own futility. No sight so thrills us as that of a great work in ruins. Even that all too familiar phrase, "The lines are down," escapes the somber sense in the public eye, and suggests

the adventure of a short, fierce battle in which the elements won.

But the practical, economic side of the picture is really serious. It means actual destruction of investment; the expenditure of funds for which the public, in its clamor for lower rates, makes no conscious allowance. It means, frequently, the saddling of an extraordinary burden upon an income calculated only on ordinary expenses and contingencies.

During the latter part of February northern Illinois was visited by a sleet storm of great severity. The Chicago Telephone Company and the Central Union Telephone Company, operating in this territory, together lost about 2,500 poles, and the wires were coated with ice which, in a few cases, reached a thickness of two inches. In addition to this extraordinary weight, the wires were burdened with broken branches of trees until they, or their poles, gave way. The velocity of the wind alone was responsible for much damage.

The companies had scarcely recovered from this attack and restored service when the cyclonic storm that caused such havoc in Omaha sent its outriders scurrying clear across the country. Many of the Illinois lines that had just been righted went down again, and Easter Sunday was full of trouble for the linemen—to say nothing of the telephone users who were waiting for them to complete their repairs. Most of the photographs we show were taken on **Easter.**

Every picture of a pole line prostrated seems, at first glance, an argument against wood poles, and a plea for some indestructible substitute. But the probabilities are that a resisting pole would be stripped to the spindle, and the tangled and broken mass of wires would be whipped into inextricable confusion.

Practically the only available line out of Chicago Easter morning was that to Milwaukee. It is underground all the way. When all important toll lines are buried, we can smile at sleet and wind. Until then, we must continue to look with apprehension upon winter rains and March breezes, and to pay a large interest upon our outside construction.

A. T. & T. ENGINEERING PROMISES.

SUCH a report as that of the American Telephone and Telegraph Company for 1912 carries its own comment, and so does not lend itself readily to editorial treatment. Those who have read the company's previous reports, year by year, are too blasé by this time to gasp in amazement at the really wonderful array of figures. Perhaps we are not even as keen as we should be to see the proof presented by the report that the telephone business is one of the most substantial and satisfactory in the world. That is really the most interesting and significant thing about this yearly digest of the work of a single organization. We should forget that it is merely a statement of directors to stockholders, and remember that it represents a large enough proportion of the world's telephones to constitute a virtual guide to the expenses, profits and promises of the telephone business.

However interesting and even exciting the recital of expenses and profits may be, we will leave it to another page, whereon the report is abstracted in all its essentials. The promises are, of necessity, of an engineering nature, and they are interesting enough to quote at some length:

During the year 1912 great benefit has resulted in all parts of the country from the activities of the large engineering staff which is maintained at headquarters to work out for the associated companies problems of their plant and service. A number of important engineering developments have been initiated and many of great value have been well advanced toward completion, but have not yet reached the stage where they can be described. While a large number have been completed, a very important part of the year's progress has consisted in putting into effect in the plant and service of the associated companies those numerous improvements which have recently been developed and standardized.

A plant such as the telephone system of the United States must be so designed and constructed that at all times it may be kept in a healthy condition of growth. This growth means not only change in size, but also change in form, to meet not only conditions of increased magnitude, but also to conform by natural modifications in structure to the advancing requirements of the service, which are becoming more numerous, more complex and more exacting. The telephone plant, in all its parts, must ever be subject to a process of evolution tending always to a higher and higher type. Its capabilities of responding to these advancing requirements furnish a good test of its design and efficiency and value. A study of the engineering operations for the year shows that the plant of the Bell system has been designed and constructed so as to withstand this test and that it is capable of responding to every reasonable demand that may be made upon it and of continuing to grow indefinitely not only in size but in constantly increasing efficiency and usefulness.

Experience with the engineering devices and methods employed in the New York-Denver line, referred to in last year's report, having demonstrated their value under severe practical conditions, a systematic introduction of these improvements was undertaken and actively prosecuted throughout the United States, so that at the end of 1912 there was a total of 54,750 miles of the heaviest gauge wires equipped with the new arrangement, thus doubling their transmission efficiency, and in addition to this there were obtained, without any expenditure for new wires, phantom circuits equivalent to 12,600 miles of the heaviest gauge circuit. These improvements have brought into communication with each other places formerly too remote, and between a great number of places less remote, noteworthy improvements in the service have been reported.

Engineering plans have been completed for the extension of four heavy copper wires from Denver to San Francisco and construction work is to commence as soon as the weather permits.

The extraordinary increase in the number of the telephone wires and the difficulty of obtaining additional space underground in many places have emphasized the importance of utilizing every underground duct to its fullest capacity. This could only be accomplished through improvements in cables. Six hundred pairs of wires have been the largest number which it has heretofore been practicable to employ. Experiments were completed during the year and specifications prepared for a new type of cable providing 900 pairs, or 1,800 wires, in the space which was formerly required for 600 pairs. This will result not only in great economies in the use of cables, but also in large economies in the construction and utilization of underground conduits.

Engineering work has been done during the year upon twenty-nine telephone central office buildings and 162 central office equipments for the various associated companies. The most important of these central stations is the large new telephone and telegraph building in New York City, which is rapidly approaching completion. This is to be the largest building used for housing telephone and telegraph central office equipments and operating rooms. It will contain two telephone central offices of 10,000 lines each, the long distance switchboard and operating headquarters, and a new operating room and equipment for the Western Union service. The engineering plans and specifications for this work have been completed, so that the installation of the apparatus and wires may commence as soon as the building is ready.

The insurance department has, in conjunction with the engineering department, inspected during the year 290 central office buildings of the associated companies and, where necessary, made recommendations for reducing as far as possible the fire risk in addition to studying the plans for new buildings and additions to existing buildings, with a view to embodying in their construction the best ideas for obtaining safety and reducing the fire hazard and the insurance rates.

The work of making and revising fundamental plans for the associated companies was actively continued during the year, twenty-one such plans having been made or revised for as many

cities and for a growth in those cities of more than 600,000 stations.

Acting for the associated companies, the engineering department has co-operated with state commissions and with national engineering societies in the development of the best methods of constructing and operating electric light and power and railway wires so as to avoid interference with telephone and telegraph circuits.

The results of the latest scientific developments of the general engineering staff in the art of speech transmission have been placed at the disposal of the associated companies in the form of general bulletins, and special advice has been given in numerous specific cases. Bulletins also containing results of the latest developments and improvements in building plans, traffic engineering practice, best methods of local and toll operating, standard central office equipment, and insurance and fire protection matters have been issued.

In the numerous and diverse parts of the instruments and apparatus which constitute the plant of the associated companies, more than one thousand changes in standards have been made, producing in the plant or service improvements in economy and efficiency.

In judging of the importance of this work to the associated companies, it is in most cases impossible to set down its value in dollars and cents, but in some instances it is possible to give some indication of its value in the form of figures. This is true in the case of an improvement made during the year in aerial cables. The large savings reported last year as resulting from the improvement in cable sheaths applied to underground cables only. On account of peculiar conditions affecting overhead cables, particularly those causing vibration in the cable and a tendency to crystallization in the alloy of the sheath, the improvement could not be applied to aerial cables. Development work upon this subject during the year has been so successful that now it is possible to use an improved and less expensive alloy in the sheaths of overhead cables as well as underground cables. This results in an additional saving to the associated companies in the first cost of construction of more than $300,000 each year.

Another instance is the saving resulting from the further introduction of the so-called single ticket method of operating toll lines, the extension of which method in the service of the associated companies during the past year will bring about economies of operation amounting to several hundred thousand dollars per annum.

Other improvements introduced in the service are new forms of cord circuits for local and trunk line work; improvements in local operating efficiency; improvements in toll line efficiency; improvements in toll cord circuits; improved forms of relays for switchboards, and improved switchboard cords. While all of these represent substantial gains in efficiency, they also represent important economies which, according to a conservative estimate, amount to more than a million dollars a year.

Although the total savings from such work as this are real and accrue from year to year and are much larger than any figures which have been set down here, it is in most cases impossible to trace them in the books of the companies for the reason that so often the result has been that the saving has appeared in the form of improved service without a corresponding increase in rates. Even where the savings are direct and tangible, it is often impossible to find them in the books. This is well illustrated in the case of the very substantial and definite saving resulting from the improvement in cable sheaths for overhead cables. An examination of the books would show that cables actually cost very much more even after this improvement than before. The explanation of this is found in the large increase in the cost of the other raw materials entering into the construction of the cables. The effect of such savings as this, therefore, is to prevent the total costs from rising as high as they otherwise would.

Nothing very startling in itself, unless it be the New York-San Francisco line, and that was announced months ago. "Improvements in local operating efficiency" may or may not hint at a new system of automatic call distributing to compete with automatic and semi-automatic systems. But the general promise is optimistically for better service and higher efficiency everywhere; and the credit for it all goes frankly to the engineer. He is the biggest man in telephony today—bigger than he ever was before.

EXISTENCE OF TRUSTS DENIED

Attorney-General Ross Collins of Jackson, Miss., received the respective answers to the ouster and penalty suits which he filed some weeks ago in the chancery court of Lauderdale county against the American Union Telephone Company, the Western Union Telegraph Company and the Cumberland Telephone and Telegraph Company, in which those corporations are charged with being engaged in a combination of interests in restraint of trade and competition.

The American Telegraph and Telephone Company of New York files an answer which covers 25 pages of cap paper, specifically and categorically denying and rejecting every allegation, imputation and charge whatsoever. It specifically denies any "complete ownership of all telephone companies in the United States"; that it and the "Bell System" are synonymous; that it owns any stock in the Cumberland Telephone and Telegraph Company, or that it is in any combination therewith.

It is admitted that in 1909 the American Telephone Company purchased 296,512 shares of stock in the Western Union Telegraph Company, out of 998,-171 shares, but denies control, and so on, and furthermore, it denies having business interests in Mississippi.

A similar document, though not quite as voluminous, is the answer of the Cumberland Telephone and Telegraph Company, drawn up by Hunt Chipley of Atlanta, general counsel, which specifically disclaims and denies everything with which it is charged by the attorney-general.

OFFICERS OF NATIONAL ASSOCIATION

The board of directors of the National Independent Telephone Association came together March 3 to name the officers for the ensuing year. With the exception of the second vice-president, the officers were all re-elected, as follows: President, Manford Savage, Champaign, Ill.; first vice-president, E. B. Fisher, Grand Rapids, Mich.; second vice-president, N. G. Hunter, Wabash, Ind.; secretary and treasurer, Richard Valentine, Janesville, Wis.; assistant secretary and cashier, Miss N. Thompson, Chicago, Ill. The board also selected from its membership the following named as its executive committee: Manford Savage, H. D. Critchfield, E. B. Fisher, N. G. Hunter, R. Valentine, L. D. Kellogg and J. B. Earle.

CHICAGO PROPOSES FIRST AID

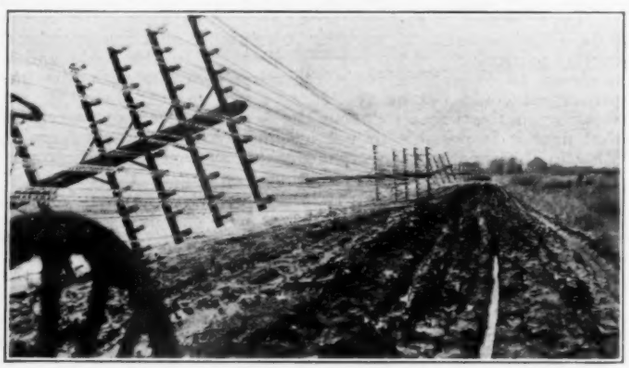
A plan proposed in Chicago may make it possible to secure quick emergency attention in case of injury, by the coöperation of the Chicago Telephone Company and the police department. It is proposed that in case of accident, or where immediate medical attention is needed, any person may call up "Main 13," the police call. Connection will at once be made with the nearest police station by the telephone company, and the desk sergeant in turn will send the nearest physician on the first-aid list in his possession to the address given. In case of serious accident this first-aid emergency service through the nearest telephone might prove of great value.

Rio Janeiro and Sao Paulo, Brazil, are to have telephonic communication. Various other cities along the 310 miles which separate those points are also to be given telephone service.

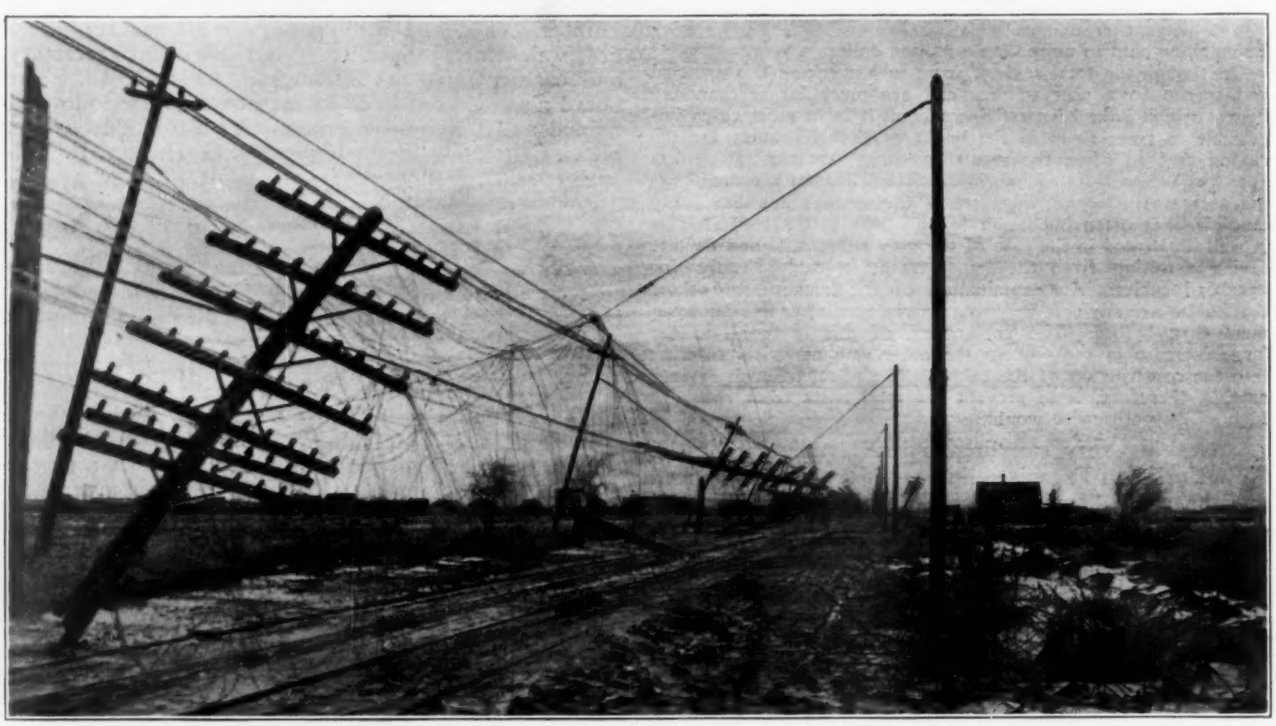
Picture Stories of the Ravages of Wind and Sleet

The Omaha Disaster of March 23. Some Quick Emergency Repair Work on a Joint Pole. The Pole Stood.

A Dead Toll Line in a Desolate Country. Photograph March 23.

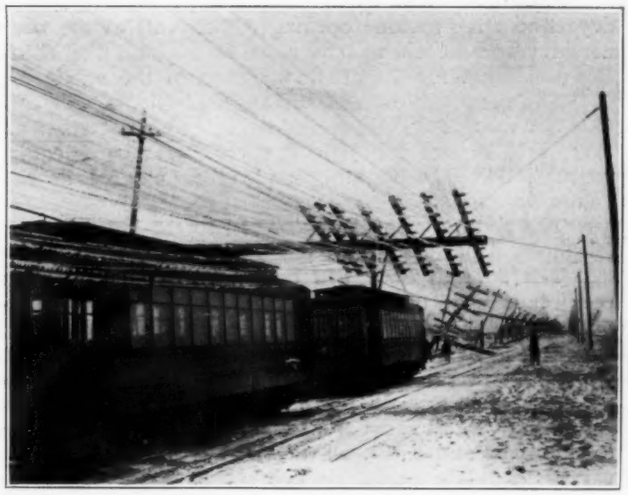


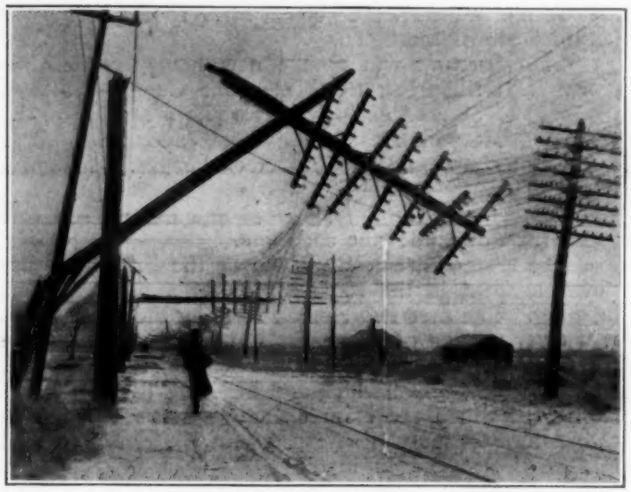
The Chicago Telephone Company's Joliet Line, After the Storm of March 21.



A Beautiful Tangle of Toll Lines, Trolley Wires and Electric Light Wires on Kedzie Avenue, Near 51st Street, Chicago, March 23.

Picture Stories of the Ravages of Wind and Sleet

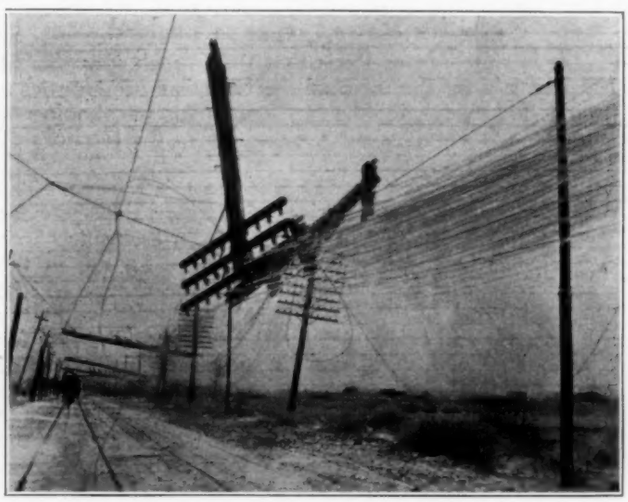


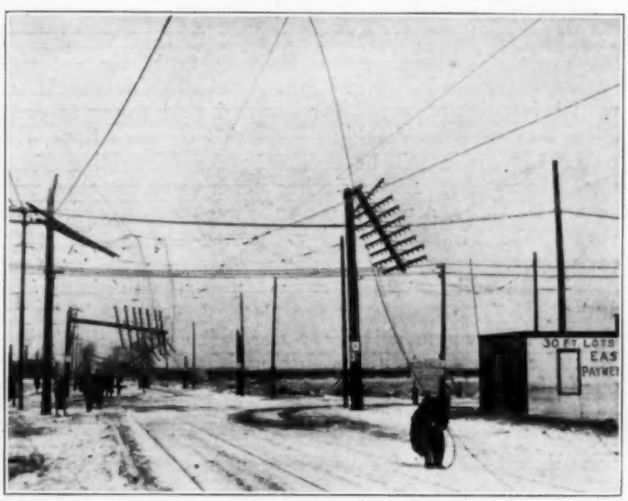


Where the Lineman Needs Skill, Patience, Caution, Speed, and All the Other Qualifications, While the Telephone Company Foots the Bills.

The Illinois and Michigan Canal Full of Long Distance Lines and Broken Poles.

The Repair Crews Were on the Job.





Two More Examples of Inevitable Expense and Labor Not Generally Appreciated by the Impatient Telephone Subscriber.

Cincinnati's New Telephone Home

Marble, terra cotta and wire-cut brick form the surface materials of the magnificent $500,000 telephone building, work on which is going forward on the site of the old St. James hotel on East Fourth avenue and Hammond street, Cincinnati. A roof garden will be a feature of the building.

The structure will be the new home of the Cincinnati and Suburban Bell Telephone Company and is designed to be used exclusively for the purposes of the company. It will house the general executive staff as well as the main and long-distance exchanges. The building will have a frontage of 83 feet on Fourth avenue and 120 feet on Hammond street and extend 180 feet above the Fourth avenue curb line.

The type of architecture will be the French renaissance, adapted to the requirements of a modern office building. The first two stories, forming the base of the structure, will be of white St. Lawrence marble. The main shaft of the building will be of dark red, rough, wire-cut brick, above which and inclosing the two upper stories, in which the main exchange floors will be located, the exterior will be faced with white, semi-glazed terra cotta, veined to match the marble below. The building will be crowned with a balustrade of the same material.

The construction will be as fireproof as it is possible to make a modern building, with floors constructed of a combination of hollow tile and reinforced concrete, supported on a riveted framework of steel girders and columns.

Elevators and stairs will be inclosed in fireproof shafts, lined on the interior with white, glazed tile. In addition to the fireproof staircase entirely inclosed from basement to roof, there will be an inclosed, spiral fire escape, located in the southwest corner of the building, with entrances from each floor and roof and landing on the Hammond street sidewalk.

Two stand pipes will be located at extreme ends of the building, extending through the roof and equipped with regulation fire hose and racks on each floor. In addition to this equipment for self-protection, these fire lines will be fitted with double steamer connections at the sidewalks and with fittings and couplings on the roof for fighting possible fires in neighboring buildings. This will prove of advantage to the fire department, providing two water towers ready for immediate use and operation from advantageous points against fires in this neighborhood in which each is intended.

The equipment of the building will be up-to-date, including three high-speed, traction type, electric elevators, complete lighting, heating and plumbing systems, with lavatories provided for hot and cold water in each office and sanitary drinking fountains on each floor, the water for which will be cooled by a refrigerating plant in the basement. Among other items to be installed will be a mail chute, a pneumatic tube system connecting the various departments and a vacuum cleaning system on each floor.

There will be ten floors in addition to the basement and attic. The main entrance to the building will be on the Fourth avenue side, near the east end of the building; the entrance will be flush with the sidewalk and open directly into the spacious main corridor, which will be lined with Italian marble.

Each floor has been designed to meet the special and peculiar conditions for which each is intended.

The first floor, which will have the appearance of a large banking room with its tile floors, marble counters and bronze grille work, will contain all of the departments with which the general public comes in contact, including the contract, complaint and collection departments. In addition to the above, a public pay station department is provided opening directly off of the main corridor and which will be open throughout the entire day and night for the accommodation of the public.

The second, third, fourth and fifth floors will contain the various offices, including the administration offices, auditing and billing department, repair, equipment, building, draughting and other clerical departments.

The sixth floor will be devoted to the long distance telephone department.

The seventh floor has been designed to meet the requirements of the heavy and intricate mechanical apparatus for the local exchange which it supports and which in itself forms a costly feature of the investment.

Quarters of the telephone operators for their use when off duty occupy the entire eighth floor and consist of a large rest room and library, dining room, kitchen, toilet rooms and baths, all of which will be handsomely furnished by the telephone company.

The ninth floor, which is connected by an additional broad staircase with the operators' quarters below, will be the operating room for the local telephone business, containing the switchboards over which calls are received and connections made to all the individual phones in the main exchange district and to the other exchanges throughout the city.

The tenth floor is reserved for a future operating room, to be occupied when a revised system of telephone operation is perfected, upon which experts are now working, and which is expected are now quicker and surer service to the public than now received by the present elaborate system of mechanism.

The entire ninth and tenth floors will be floored with compressed cork, with inlaid patterns, assuring a handsome, resilient and noiseless floor to the operators.

A feature of the building will be the roof garden. The roof will be paved with red quarry tile and reserved for the employes for recreation purposes, one of the three elevators as well as the stair shaft being carried to the roof level.

The architects for the new building are Harry Hake and Charles H. Kuck.

Modify Rates France to England

It is stated from Paris that the French government has just laid on the table of the Chamber of Deputies a project for modifying the tariff rates for telephoning to England. It provides for the division of the territory of both countries into three zones instead of two. The British government has already agreed to this scheme. The result will be that the price of conservation between Paris and London will be reduced from 8s. to 4s., both cities being in the first zone. Between Lyons, in the second zone, and London in the first, the charge will be 6s. 2d. instead of 10s., and between Bordeaux, in the third zone, and London 8s., instead of 10s. The rate for telephoning between Marseilles and Edinburgh, both of which are in the third zone, will remain at 12s. 6d., as at present. As both governments have agreed to these modifications beforehand, it may be expected that the parliaments of each country will soon ratify the scheme.

Encouraging Efficient Employees

By C. H. Coar*

EFFICIENCY concerns the production of results and in a scientific way the term is used at times to compare effort with accomplishment or input with output.

When we consider that the human element is to a large extent directly concerned in the production of results, it follows that any systematic inquiry promoted in view of accomplishing efficiency must be based to a large extent on the worker or employe.

Scientific management, efficiency engineering, and factory organization are modern terms used in a general way to designate studies or arrangements tending to accomplish efficient operation and production.

In all large modern manufacturing organizations every endeavor has been put forth by specialists to arrange the buildings and place the machinery so that lost motion or unnecessary movements are reduced to a minimum.

No doubt studies of this kind are largely responsible for the interest shown during recent years in methods tending to create efficient employes. In some organizations motion studies have been made of the various operations performed by the workers in their various occupations and all unnecessary movements are eliminated.

Time factors have been introduced and merit systems installed which provide certain standardized costs for certain operations or results. In the preliminary to all thorough studies of this kind a very careful analysis is made of all the factors entering into the employe's life, such for instances as his food, clothes, surroundings, opportunity for study, entertainment, etc. There is ample evidence that studies of this kind pay, in the surroundings and conveniences of the modern factory.

Every effort is put forth in all large organizations to instill in each employe the necessity of co-operation and in generally looking upon the business as though it were his own. Heretofore large companies have been seriously handicapped by the indifference and lack of interest shown by many of the employes and in this respect I think the officers of their companies have been largely to blame. The owner or boss in the smaller establishment is usually acquainted with the peculiarities of his workmen; he often knows their families and sometimes their troubles. Now knowledge and intimacy of this kind have certain undesirable features, but taken as a whole they are essential. Large companies have therefore recently endeavored in various ways to cultivate the spirit of fellowship found in smaller shops, through house publications, social clubs, benefit societies, and other forms of welfare work.

Telephone companies have not been backward in availing themselves of the benefits to be derived in this way and in all large exchanges organized staffs exist for the purpose of looking after the welfare of the employes. In addition to providing pleasant surroundings, various methods have been adopted by telephone companies to create satisfied and efficient employes, and the purpose of this paper is to offer some explanation concerning one of them.

An organization of scattered employes presents many problems in this respect, and particularly so in the telephone business, where comparatively low priced employes have considerable responsibility. By this I mean, for example, the chief operator in a small exchange, who is sole local representative of the company she works for. Circumstances often prevent frequent trips to points of this kind by company officers, and the internal business is therefore largely disposed of by correspondence. Digressing for a moment in this connection, it might be well to say that there are far too many hastily worded letters going out from general offices to employes of this kind. Wrong impressions are conveyed, apprehensions aroused and antagonism fostered until that biggest bugbear, discouragement, breaks up all semblance of co-operation and efficiency. Letter writing is an art. Loosely written internal correspondence is the cause of large loss today.

Political economy proposes to tell us how profits and burdns are actually shared, but ethics should guide us in showing how they should be shared. Industry should have its fruits as well as its sacrifices and every worker should experience the double effect of industry; first he is burdened and then should be rewarded.

Inquiry reveals that no small measure of Andrew Carnegie's success was due to the fact that he recognized the importance of keeping his employes interested in their work. Employes of ability were given an interest in the firm, and in reality became partners of Mr. Carnegie. Needless to say, these men were interested in their own success, hence Mr. Carnegie and his companies prospered.

It has been found to be a fundamental fact that the man of superior ability cannot accumulate for himself without giving to his employes the opportunity to participate also. Thus we are led to believe that one of the secrets of success in business, and particularly in manufacturing, is a liberal division of profits among the employes who help to make them. It is self evident that brains, industry and ability can be encouraged and cultivated, but they will never be exercised to their fullest extent by dissatisfied or discouraged employes. It is generally recognized that the standard wage scale is unfair in many ways, for it places the inefficient on the same plane with the efficient. These differences are soon noticed by employes and are bound to cause more or less dissatisfaction. Good wages on a flat rate do not always accomplish desired results, for it is a failing of the human race to be more or less ungrateful, and there is apt to be some lagging because of the thought that the limit is reached. A system of wage that keeps the "voltage" up all the time is more to be desired, hence any bonus or merit scheme is worthy of serious consideration.

Sliding scales and piece work are direct methods of permitting the employe to participate in the results of increased efforts. They are used to a great extent by manufacturing concerns, but not suited to the needs of telephone organizations. Even in manufacturing concerns it has been found advantageous to modify

*Paper presented before the convention of the Iowa Independent Telephone Association.

these systems in such a way that the worker gets a certain stated salary regardless of output and an extra sum for any amount exceeding that set as a fair day's output; that is, a sliding arrangement with a minimum wage sufficient for a fair living. In the opinion of the writer this method is far more satisfactory, for under it the employe has an assurance of a certain sum which does away with some of the uncertainty which otherwise must exist.

This plan can be adopted by telephone companies under a number of different arrangements, depending on the duties of the employe concerned. That is to say, a different detailed arrangement would, of course, be necessary for the employes of the plant, commercial or traffic departments.

It has been the good fortune of the writer to help inaugurate a merit system in the company he is connected with, and it may be of interest to know something of the plan we adopted. The merit system is intended for operators only at the present time, but we expect gradually to increase its scope until practically every employe will participate in its advantages. The operators concerned here are employed in various sized exchanges, mostly small, and in addition to their operating duties they are often required to keep the books, do the collecting and otherwise act as the company's local representative. This is a customary arrangement in the smaller exchanges. In this plan, the various exchanges are grouped and classed as A, B, C, D, etc., exchanges, the exchanges in each group being selected so far as is practicable on account of their similarity in amount of traffic, number of operators, hours, reports, lines and telephones.

Suitable cash prizes are given each month to each group. The prizes are proportioned in view of making proper allowance for the work involved and the help employed at the different exchanges. For example, a two-operator, fifty-line exchange will not participate in as large a prize as will two operators in a 150-line exchange, because the girls in the smaller exchange do not have the same amount of work to do. The prizes go to the exchange and not to individuals, but they are divided among the operators of the exchange securing one pro rata according to their salaries. It is therefore necessary for all employes in any exchange to work with a common view in mind, as each employe participates in the prize and her neglect or attention to business figures in the total results accordingly. This results in creating a common interest among the employes of the exchange.

In the system the daily routine is classified and listed under certain heads as follows:

Care of Property: Condition of offices, fixtures and apparatus, taking into consideration repairs needed thereon.

Care of Business: Complaints received or given, promptness in answering correspondence, forwarding of all kinds of reports, time sheets, etc. Installations and cut-outs.

Condition of Reports: Local and long distance accounts, billing, toll tickets, as to accuracy, neatness, percent of errors to total, general office attention required on account of mistakes or lack of information, etc.

Traffic Standing: Results of local and long distance service tests made by chief operator or others, overtime and cancellation percents.

Collections: Promptness, amount, percent of collected to total.

Examinations: An average of the standing of all operators in the exchange on an examination made by the chief operator on questions pertaining to your rules, routings, bulletins, etc.

Expense for Sundries: Amount spent for miscellaneous care of office, brooms, oil, matches, mops, etc.

The above classification could be elaborated upon or condensed to suit the ideas of any company.

For the purpose of determining the standing of the different exchanges the following general classified duties are allowed a certain per cent of 1000, and are later divided into detailed duties, each having its certain percent:

General Classification—	Percent
Care of property	75
Care of business	100
Condition of reports	175
Traffic standing	200
Collections	200
Examinations	175
Expense for sundries	75
Total	1,000

The various departments tabulate the demerits against the different exchanges as they check over the work and at the end of the month the final standing is ascertained and the prizes awarded accordingly.

It is, of course, essential to divide up the general classification into units and proportion to such units a proper percent for demerits, bearing in mind to allow the more important duties the largest percents. However, the demerits should not be made so large that the number charged against any particular classification will ordinarily be more than the total precent allotted to such classification.

The demerits can be arranged in this manner in such a way as to bring particular stress on any certain duties which are in need of special attention.

When the standings are ascertained each month a circular is forwarded to each exchange showing the standing of all exchanges. A personal letter accompanies the circular, complimenting or encouraging the force at the exchange addressed. Each member of the force is thus acquainted with the standing of all the exchanges and with the deficiency of her own exchange if there be any.

The success of a system of this kind necessarily depends to a certain extent upon the employe of the general office who are responsible for checking the demerits against the various exchanges. Every effort must, of course, be made to have the demerits uniform and they should be checked without the slightest semblance of partiality.

This arrangement may appear somewhat unscientific or cumbersome, but it has the redeeming feature that it will tend to keep interest up and give to those who put forth a little exra effort a reward that is justly due him.

We have also found it mutually beneficial to give our operators the fourth month's rental of any telephone they secure on the company's contracts. The girls know who the "spongers" are and this makes it an object to get after them.

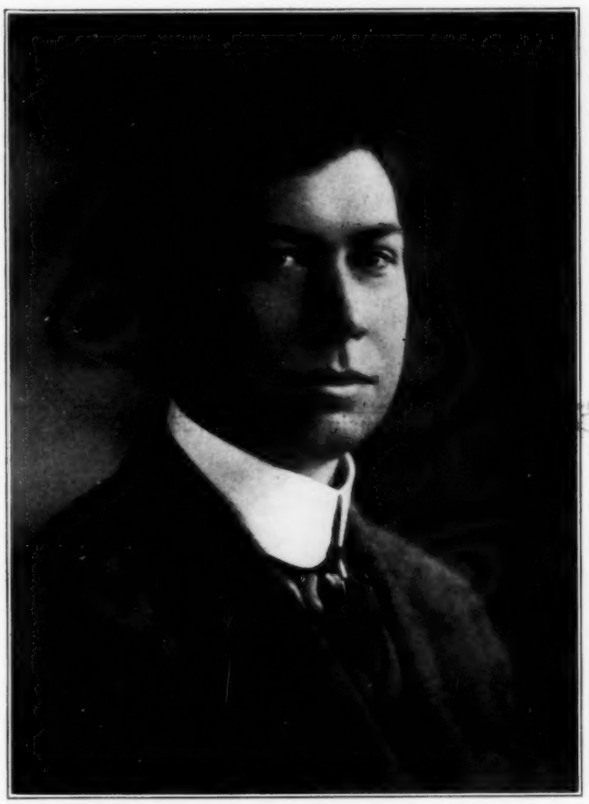
You will possibly wonder why all this concerns the operator and not other employes. We started with the operator because we think as a rule her services are underestimated and need a more general reconstructing so far as salary is concerned. We hope to be able to inaugurate a similar system for other employes.

Who's Who in the Telephone Game

Facts and Fancies About a Man You Know or Ought to Know

THOSE of you who may have visited the plant of the North Electric Company at Cleveland, a few years ago—winter or summer—will recall that George Steele wore a very old and dreadfully soiled straw hat and that Charlie North had so much stuff on his desk that it refused to close up. The atmosphere around the general offices was more or less like that. Things didn't seem to be stirring downstairs. In the floors above there was the whirr of machinery, but it acted as a lullaby for the folks on the floor below! You handed your card to the information clerk, who had the air of a department store inspector; she chewed steadily on her gum and after a while telephoned your message. Sometimes you waited longer than the outward evidences seemed to warrant. The reception room was cheerless. You wondered at such dinginess in an aspiring sixth city.

There are tricks in every trade, and more recent events may account for the lethargy which seemed to pervade the North shop a little while ago. You have had no occasion to criticise the concern's activities of late. The first shock came with the announcement that it would abandon the making of manual stuff—temporarily at least. Then came the news that a modern factory was being built at Galion—the highest point in the state—safe from all floods. You know what the line is, of course, Automanual, every minute. The general offices remain at Cleveland; the selling offices at Chicago.



He Has Been an Automanual Enthusiast Ever Since He Saw It.

It will not be necessary to tell about the Telephone Improvement Company, except that as the holding concern it introduced some new faces to the telephone manufacturing end of the business. Among those new faces Garrison Babcock's looms large. Whether Mr. Stevens found Mr. Babcock or whether Mr. Babcock found Mr. Stevens doesn't matter, but Garrison Babcock's name was written on the roster about the time the dust began to fly at the old premises of the North Company on St. Claire street, and there are no more cradle songs for the girlie who chewed the gum—at least, not if she is still punching the time clock.

Garrison Babcock appeared conspicuously on the independent telephone horizon with his Telechronometer which was displayed at one of the conventions three or four years ago. The Telechronometer measures telephone conversation—all of it. When you lift the receiver, the wheels go around and they keep at it till you hang your receiver up. It is about as popular as other meters, but it is right. When you call the p. b. x. operator and ask for Jones and Jones happens to have just left for the day without telling anybody, the operator calls all the stations at her disposal and keeps you hanging on for fifteen minutes at so much per minute, much the same as a taxi meter while you dine. Like electric light, you pay for all you get. Garrison Babcock's other nineteen inventions are about as simple as that! They deal with lock-out and fire alarm systems and switchboard development.

He has been an Automanual enthusiast ever since he saw it and has had a hand in all the details that led up to the present splendid organization. Right now he is too busy with Automanual to think of anything else, but he isn't forgetting the Telechronometer, even at that.

Mr. Babcock is only thirty-four, but he has had all kinds of electrical experience since he quit school. He was with the Bell of Buffalo for a year and a half; electrician for U. S. S. Buffalo for about the same length of time, touching at Manila on one cruise; nine months with Rochester Telephone Company; a year as state inspector for Wisconsin Telephone Company; rebuilt the entire plant as general manager of the system at Grand Rapids, Wis.; three years as sales engineer with Stromberg-Carlson Telephone Manufacturing Company; five years as consulting engineer at Rochester, during which time he installed his lockout system for the Home Telephone Company at Albion.

Garrison Babcock was born at Canandaigua, N. Y., July 21, 1879. His father was a minister who devoted much of his time to instructing his son, who also had schooling at Coschocton and Buffalo, district, public and technical. In 1901 Mr. Babcock married and two boys and a girl have taken up quarters at his home since then. He is a Mason; a whist fan; and places fishing at the head of his recreation list, which

includes the whole catalogue of outdoor sports. If you were ever in the vicinity of Lake Canandaigua you will understand why the memories of boyhood pastimes would cling to the hook and line. If there be any distinguishing characteristic, it is his intense application to work and study. Mr. Babcock is resourceful, has abundant self-control and lots of energy. He finds himself in a truly fascinating occupation and feels that the telephone business offers him splendid opportunity for a permanent and satisfactory business.

U. S. Telephone Case to Supreme Court

The United States Telephone Company, whose appeal for an injunction against the American Telephone and Telegraph Company and the Central Union Telegraph Company, the Bell concerns, restraining the latter from interfering with long distance contracts between the United States Company and independent telephone exchanges in small towns of Ohio and Indiana, was denied by the circuit court of appeals in Cincinnati on January 10, has applied for a writ certifying the case to the Supreme Court of the United States, according to information from Washington.

The case, which was brought by the United States Telephone Company in the Federal court for the northern district of Ohio in 1908 in an effort to destroy the alleged Bell monopoly, which was then at war with the United States Company in Ohio, Indiana, Michigan, Pennsylvania and West Virginia, was decided adversely to the complaints by the late Judge Robert L. Tayler at Toledo on May 20, 1909. In his decision Judge Tayler held that to destroy the Bell monopoly would be to create another held by the United States Company. The court of appeals recently affirmed this decision.

The petitioners charge that the Bell concern has tampered with United States Company clients, causing them to break their contracts with the United States Company and renew them with the Bell service in a large number of instances. The petition names as towns in which such interference with existing contracts was done: Attica, Buffton, Carey, Celina, Delphos, Elida, Middlepoint, Mt. Victory, Paulding, Richwood, Spencerville, Wauseon, Lebanon and Wapakoneta, Ohio, and Butler and Middlepoint, Ind.

The petition also charges the Bell Company with the use of unfair methods in issuing a publication setting forth a list of United States Telephone Company projects branded as failures. Among these was the Cuyahoga Telephone Company, of Cleveland, a concern which still exists and which the complainants deny is a failure.

Meter Tab Kept on Telephone

Just how many telephone calls per day does the average business telephone have to carry? Does a cigar store telephone carry more calls than a drug store, and if so, why? These and innumerable other queries are being investigated in Lincoln, Neb., by the state railway commission by a series of tests being made by meter at the present time, and it is understood that some amazing things have been discovered relative to the number of calls a modest looking O street business house has to accommodate on its telephone.

The tests are being made by means of meters attached to the lines in the central office.

The service charge method is claimed by many telephone experts to be the only system for cities of any size. Others claim it could not be employed in a city the size of Lincoln, although it works efficiently in cities like Chicago.

The manner of figuring service charges varies considerably, even in the same city. Usually the local resident telephones are put on meter service or there is a charge made for each call somewhat after the manner of the Lincoln pay stations. Then the business telephones of various kinds are put on a graded service, after an investigation has been made as to the volume of business; some business telephones paying much more than others, but all receiving what is known as unlimited service.

A great difficulty, it is predicted, will have to be overcome by the business houses of the city, in the line of telephone service. Where formerly a business house maintaining the Bell and automatic telephones, the service was divided and gave in many cases just about capacity service on each telephone.

Now the manual telephones have been cut over and these business houses are left with only one telephone in service.

Telephoning Over Uninsulated Cables

It is reported that telephoning over a bare iron submarine cable has been accomplished by the invention of an Englishman. Using ordinary telephone apparatus, clear-speech transmission was obtained, and even the loud-speaking reproduction of a phonograph record, over eleven miles of this uninsulated cable. From present advices it appears that a thin layer of hydrogen on the surface of the immersed conductor, supplied electrolytically by a polarizing or "pilot" current performs the function of the usual dielectric—certainly an ideally cheap insulation. Another advantage claimed is the elimination of electrostatic capacity—a very important point where long-distance submarine telephony is concerned.

Bell Triangle Club Formed by Employees

The Bell Triangle Club was organized with almost 200 members and 125 present at the first gathering of the body which is designed to promote the social and industrial conditions of the employes of the company in the territory included within the triangle of towns, Allentown, Bethlehem and Easton, better known as the Allentown district. It will virtually take in all Bell employes from Hackettstown, N. J., to Mauch Chunk and Stroudsburg.

George Wolf, the local manager of the company at Allentown, was elected president; Alfred Margle, vice-president; Miss A. Pendergast (chief operator of the Bethlehem exchange), secretary, and Samuel Paln., treasurer.

The name of the Bell Triangle Club was selected because the initials are those of the Bell Telephone Company, and because the club is a triangle of the employes in the commercial, plant and traffic departments. The Crockery Hall was selected as the regular meeting place.

Local topics will be discussed; matters of local telephone service will come in for particular treatment and dancing will likely be made a feature of the future social sessions.

A. T. & T. Company's Annual Report

THE report just issued by the American Telephone and Telegraph Company for the year ending December 31, 1912, shows that the telephone has become in the United States, to a greater extent than anywhere else in the world, a household necessity. There are now 70,000 towns, cities and hamlets from which telephone messages may be sent. This is 5,000 more than the number of post offices in the United States; 10,000 more than the number of railroad stations and nearly three times the number of regular telegraph offices. There are altogether 7,456,074 telephone stations in the Bell system, which is an increase over last year of 823,449 stations. This compares with an increase during the previous year of 749,906 stations.

Including the traffic over the long-distance lines, but not including the connecting companies, the daily average of toll connections in 1912 was about 738,000, and of exchange connection about 25,572,000. This compares with 645,000 and 23,484,000 in 1911. Speaking broadly, this means that the daily average of telephone conversations last year reached 26,310,000, or at the rate of about 8,472,000,000 for the year, as against 24,129,000 in 1911, when the rate was 7,770,000,000 a year.

Theodore N. Vail, president of the company, gives some highly interesting statistics comparing the telephone traffic in the United States and Europe with the operations of the mail and telegraph services. Taking the last available figures—those for the year 1911—the records may be thus summarized:

	Europe		United States	
Type of Message	Number During 1911	Per Cent of Total Europe	Number During 1911	Per Cent of Total U. S.
First Class Mail Matter	16,500,000,000	72.2%	9,700,000,000	40.1%
Telegrams	370,000,000	1.6%	108,000,000	0.4%
Telephone Conversations	6,000,000,000	26.2%	14,400,000,000	59.5%
Total	22,870,000,000	100.0%	24,208,000,000	100.0%

These figures show that while Europe has three and a half times the telegraph traffic of the United States and nearly twice the first class mail traffic, it has only two-fifths of the telephone traffic, owing to the greater efficiency and distribution of the telephone in this country.

The Bell system showed a gross revenue—not including that of the connected independent lines—of $199,200,000. This was a gain of $20,000,000 over the previous year. A very careful appraisal conducted by the engineers of the physical property of the Bell system as of August 1, last, showed that while the book cost was $736,000,000, the cost of reproduction at that date would have been $797,000,000. In other words, the company was carrying the property on its books at $61,000,000 below its actual physical value at the time of its appraisal. In this appraisal there were included no intangible assets whatever, such as good will, patents, franchises, cost of developing the business, etc. For the year there was an increase in assets of $92,300,000, of which $75,600,000 represented current additions to the plant, including the necessary real estate. During the five year period between 1907 and 1912 the assets of the Bell companies have increased $311,000,000 while the capital obligations and payables outstanding have increased only a little over $199,000,000. The surplus and reserves have increased from $61,300,000 to $164,200,000, or nearly $103,000,000, even after setting aside $8,845,000 for the benefit fund recently created for the employes.

The American Telephone and Telegraph Company itself shows total earnings of $42,717,992.75, and a balance of $6,047,357.64 after payment of interest and the regular dividends of 8 per cent per annum. At the close of the year its outstanding capital stock was $334,805,700, and bonds $105,002,000. For the capital stock outstanding there has been paid into the company's treasury $356,732,218, or nearly $22,000,000 more than the par value of the stock.

Scarcely any corporation in the United States has its capital stock more widely distributed than the American Telephone and Telegraph Company. A majority of the shares are held by women and less than 7 per cent is held in the name of brokerage houses. The average number of shares held by each stockholder at the close of 1912 was shown to be 66.

The number of shareholders on the books of the American Telephone and Telegraph Company at the close of the last year was 50,297, which indicates an increase for the year of 2,956. The following extremely interesting table shows just how the stock of the company is distributed and the number of shares held by both large and small holders:

43,553 held less than 100 shares each;
6,354 held from 100 to 1,000 shares each;
356 held from 1,000 to 5,000 shares each;
19 held 5,000 shares or more each (omitting brokers and holders in investment trusts, etc.).

Of the holders of less than 100 shares each, 9,450 held 5 shares or less each; 31,953 held 25 shares or less each.

The report tells of the new plan announced January 1, last, for employes' pensions, disability benefits and insurance adopted by the American Telephone and Telegraph Company, by its associated companies, by the Western Union Telegraph Company and by the Western Electric Company. For the purpose of inaugurating these benefits the American Telephone and Telegraph Company made an initial appropriation of $2,000,000. There are about 200,000 employes—men and women—in the service of the companies concerned who will be directly or indirectly affected by this provision. The plan has been elaborately worked out and will, it is believed, result in the increased happiness and betterment of employes.

The company has worked hard to secure the long-planned ocean to ocean service. On this point President Vail says:

> Experience with the engineering devices and methods employed in the New York-Denver line having demonstrated their value under severe practical conditions, a systematic introduction of these improvements was undertaken and actively prosecuted throughout the United States, so that at the end of 1912 there was a total of 54,750 miles of the heaviest-gauge wires equipped with the new arrangement, thus doubling their transmission efficiency, and in addition to this there were obtained, without any expenditure for new wires, phantom circuits equivalent to 12,600 miles of the heaviest gauge circuit. These improvements have brought into communication with each other places formerly too remote, and between a great number of places less remote, noteworthy improvements in the service have been reported.
>
> Engineering plans have been completed for the extension of four heavy copper wires from Denver to San Francisco and

construction work is to commence as soon as the weather permits.

In thirty-three different states there are public service and other state commissions which supervise the telephone service. This supervision is entirely distinct from the supervision of the Interstate Commerce Commission. The report contains the interesting letter addressed by Attorney-General Wickersham to the chairman of the Interstate Commerce Commission at Washington touching the activities of the company and also the order made by the Interstate Commerce Commission as of January 13, last, directing that a thorough investigation be made "concerning the history, the financial operations, the rates, rules, regulations and practices of telephone and telegraph companies subject to the Act to Regulate Commerce, with a view to the making of a comprehensive report and to the issuance of such order, or orders, as may be necessary to correct such discriminations and make applicable reasonable rates and practices." The policy of the company, as in the past, will be to coöperate with the examiners conducting this investigation and to aid public officials in every possible way in their effort to ascertain the real facts respecting the telephone service of the United States.

President Vail says in conclusion:

As to the future of the company, it was never brighter. Business indications are normal, our relations with the public and with the public authorities on a mutually satisfactory basis.

The organization on the lines set forth in previous reports is about complete, and the division of the work is so clearly drawn and so closely correlated between the local administration of the associated companies and the central general administration of the American Telephone and Telegraph Company that there is no duplication of effort or conflict in administration.

South Manchuria Telephone Service

Vice Consul Raymond S. Curtice, Dairen (Dalny), Japanese Leased Territory, reports that the basis for the present telephone system in South Manchuria was laid during the Russo-Japanese war. The system then comprised 370 miles of wire, with only 78 subscribers in Dairen. There were only three exchange stations open for public use—Liaoyang, Mukden, and Antung. There were no long-distance lines except the Liaoyang-Mukden stretch.

From his first appointment the new general postmaster of the Kwantung Government General devoted much attention to this service in connection with the telegraph system, and the extension of telephone lines was completed in March, 1912, when subscribers numbered 3,272, against 2,963 in 1911 and 472 in 1907. Meanwhile the length of line has increased 3,208 miles.

Since taking over the system from the army authorities, when there were only three exchange stations —Antung, Liaoyang, and Mukden—open to the public, the following 11 new stations have been added: Dairen, Tiehling, Kungchuling, Port Arthur, Liushutun, Hsinminfu, Changchun, Chienchinchai (Fushun Colliery), Chinchou, Tashihchiao, Kaiyuan. All these exchanges are now connected by long-distance telephones, in contrast to the single stretch of long-distance wire in operation in 1906.

There have also been established and put into operation 39 automatic telephones—17 in and about Dairen (including one each at Laohutan and Shaokangtzu, and three at Shakokou, of which two were opened just outside the railway workshops), seven at Port Arthur, four at Mukden, and three at Antung.

In a district in which two such different languages as the Chinese and Japanese are so commonly used, the question of exchange operators has caused no little difficulty on account of the bilingual training necessary. Male operators are employed at all the exchanges except Dairen, Port Arthur, Tashihchiao, Mukden, Tiehling, and Antung. As the authorities are training all operators in both languages, the Chinese are easily enabled to use the telephone connections; in fact one-fifth of the total number of subscribers are Chinese. The only complaints so far have come from Mukden, where the operators newly arrived from Japan had not yet mastered enough of the Chinese language to be of service to Chinese subscribers. This difficulty was only a temporary one, however, and is being rapidly overcome.

Methods of Safeguarding Lines

The safeguarding of transmission lines was a subject given especial consideration by H. B. Gear of Chicago at the recent convention of the Western Association of Electrical Inspectors at St. Louis, Mo. That the subject is one for earnest and concerted action is generally felt as the possibility of the loss of life by operators and great damage to telephone and telegraph equipment in case of a cross with high-tension lines is the price paid for the non-safeguarding of the transmission lines.

The railroad, telephone and telegraph companies have sought, independently, to do something in the way of protecting the lines. The railroads were responsible for the use of wire cradles or net-work to catch any broken wires and the bridge-construction to carry conductors across their right of way. But the cradle construction was an extra burden on the poles and quite likely to cause a new kind of trouble of its own, and the bridgework idea was impractical owing to the expense it entailed.

However, Mr. Gear explained, the specifications, some adopted and some still under consideration by a number of companies and suggested at a series of conferences in 1911 and 1912, promise to offer the necessary solution. And the remedy is simple, after all. It is based upon the principle that it is more practical to increase the safety of the line itself than to burden it with auxiliary safety and protective devices. The specifications refer to all crossings over railroads and telephone lines where the voltage is more than 5,000. There are to be no turns in the transmission lines and they are to be above both telephone and telegraph wires. A metallic strip is to cover the cross-arms and will be grounded in order that the line may be put out of service by automatic devices at the power house in case of a break in the conductor.

As to Public Ownership

In a statement expressing opposition to the proposal for government ownership of the railroads, telegraph and telephone systems, electric roads and other public utilities, Cardinal Gibbons declares that year by year the great public service corporations are becoming more and more public property. He said:

"Five years ago when Theodore Vail became president of the American Telephone Co., there were 18,000 stockholders. Now there are over 50,000. The corporation serves 25,000,000 people daily."

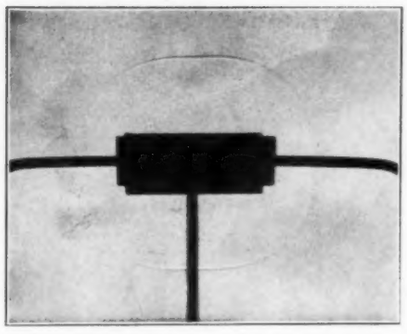


Fig. 1.—Side view, showing cylindrical shape of wave.

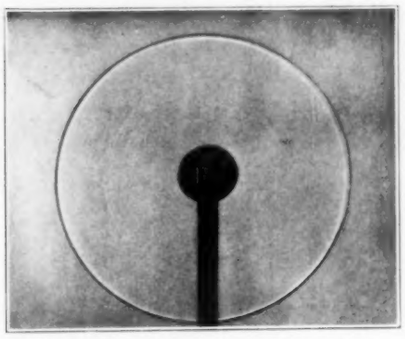


Fig. 2.—A simple sound wave seen end-on.

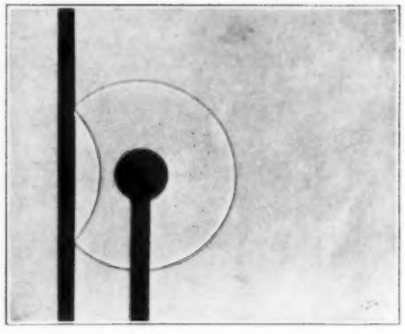


Fig. 3.—Sound wave reflected from plane surface.

Visual Studies of Sound Waves

Some Vocal Photographs

IN our day one does not need to be a physicist to know that wave motion of one kind or another plays an important part in nature and in technical applications of natural phenomena. The simplest and most obvious type of wave motion—the one to which the name is primarily applicable—is that which we observe in the ripple in a teacup, a surface-tension effect, or in the mighty ocean billow rolling on under the action of gravitation. Such waves are essentially two-dimensional—at least their direction of propagation lies in a plane. A typical wave front in this case, such as that produced by a stone falling into a pond, is circular in form.

Other waves, and a very important class, are three-dimensional, the typical form being spherical, each wave starting out from a point source, and spreading out as a sphere with that point as its center. Light waves are of this character, as well as the waves used in wireless telegraphy. In fact, the two are propagated with the same velocity through vacuum, and are identical in character except as regards their wave-length, which is of the order of one fifty-thousandth of an inch in the case of light, and of the order of several thousands of feet in the case of the electric waves commonly used in wireless telegraphy.

While the circular waves on a sheet of water are readily observable and known to every child, it is only by special means that spherical waves can be rendered visible. Light waves are themselves of course invisible—contradictory as this may seem. A beam of light passing through a perfectly dustless space is absolutely invisible to an eye looking across the beam. In this sense it may indeed be said that no eye has ever "seen" a wave of "light." But there is another kind of spherical waves—sound waves—which, though ordinarily quite as invisible as waves of light or electro-magnetic waves, can nevertheless, by suitable means, be rendered observable to the sense of sight. A particularly fine method for effecting this has recently been developed by Prof. A. L. Foley of Indiana University, in collaboration with Mr. W. H. Souder. By the kind permission of Prof. Foley and the courtesy of the editor of the *Physical Review*, in which the first account of this method appeared, we are enabled to give here an indication of the nature of the process followed, and to show some of the very fine photographs obtained.

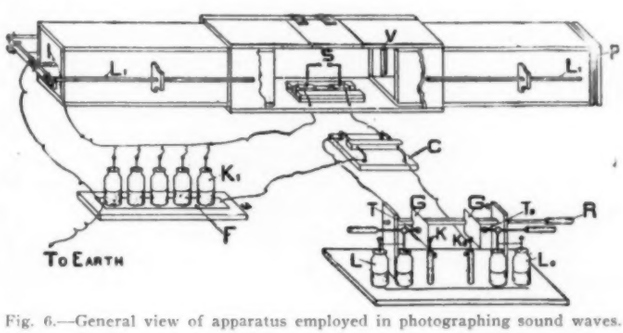


Fig. 6.—General view of apparatus employed in photographing sound waves.

The method is best explained by reference to the diagram Fig. 6, which shows the apparatus employed.

Four spark gaps S, I, TK, and T_0K_0 are arranged in series in a circuit in which a large electric induction machine is included.

The gaps TK, T_0K_0 serve merely as a means for producing a spark at the desired moment by turning the glass plates GG out of the way—these plates being normally interposed between the

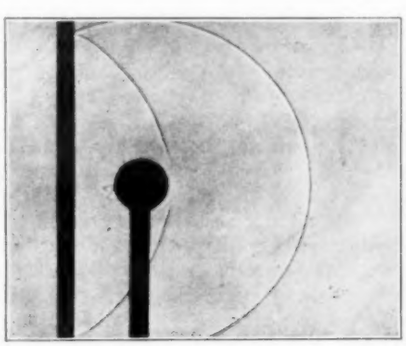


Fig. 4.—The same wave as fig. 3, photographed a moment later.

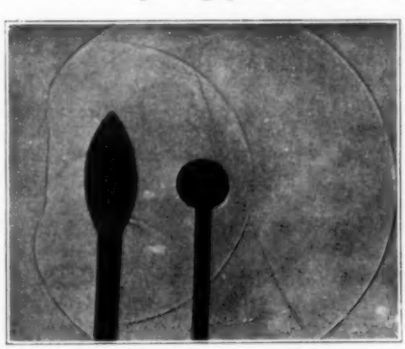


Fig. 5.—A lens converts a spherical into a plane wave.

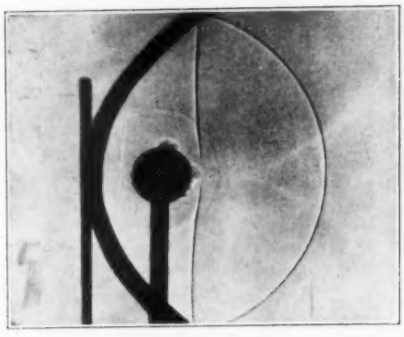


Fig. 7.—Similar effect produced by a parabolic mirror.

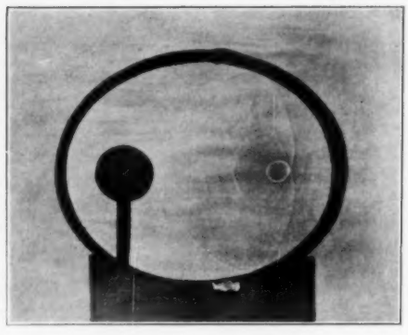


Fig. 8.—Reflection from one focus of eclipse to the other.

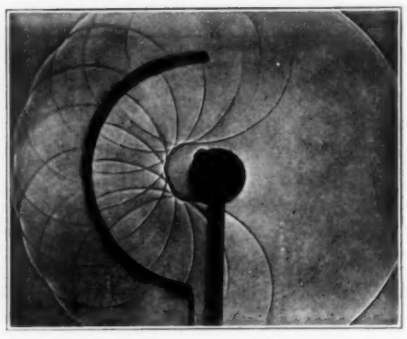


Fig. 9.—Diffraction pattern produced by a grating.

knobs T, K, T_0, K_0, as is clearly shown in the diagram.

Every time a spark is thus called at T K, T_0K_0, a similar discharge occurs at the gaps S and I also. The "sound gap" S is so arranged as to give a loud discharge, thus sending out a sound wave consisting of alternate layers of compressed and rarified air. The gap I, on the other hand, has its terminals made of magnesium wire, so as to give a brilliantly luminous discharge. The Leyden jars K_1, together with other features that cannot be discussed in detail here, serve to delay the discharge at I so that it occurs by a minute fraction of a second later than that at S. Hence the light from I arrives at S when the sound wave has traveled a certain distance out from its source. A photographic plate (or the observer's eye) is placed at P, and as the layers of air of different density, of which the sound wave is formed, have different refracting powers, the appearance shown at P is that of a dark ring on a light background.

The waves produced by this apparatus are not strictly spherical in form, but consist of cylinders with hemispherical ends. As these are viewed end-on, however, the appearance presented is exactly the same as if we were dealing with spherical waves.

Of the photographs so obtained, we reproduce a few typical examples. Fig. 1 is a broadside view, showing the cylindrical form of the wave. A simple transverse section is shown in Fig 2. Very interesting is Fig. 3, which shows the appearance presented when the wave hits a reflecting plane obstacle ("mirror"). The forward part of the wave (on the right) travels on unchanged, but a similar secondary (reflected) wave is produced at the reflecting surface, and travels out in pursuit of the original wave, as seen in Fig. 4, which represents the state of affairs at a slightly later instant.

The action of a lens (sulphur dioxide contained in a collodion envelope) is shown in Fig. 5. It will be seen that the wave, starting from the focus of the lens on the right, emerges as a plane wave (parallel rays) on the left. A similar effect produced by a parabolic mirror is shown in Fig 7. Here also the wave emerges after reflection as a plane wave. A very interesting case is shown in Fig. 8. A wave starting out from one focus of an ellipse (at which the knob of the sound gap appears) is reflected and brought to a point at the other focus of the ellipse. Finally, a very fine interference pattern is produced, as shown in Fig 9, by a cylindrical grating placed in the path of the sound wave, with the source at the center.

It may be remarked that more recently Prof. Foley has further extended his researches, using the method here outlined, for the study of the electric spark discharge.

Noise Indicator for Nursery

Are the children all sleeping soundly? Every night brings that same question to untold thousands of homes in which mothers are glad to have their little ones in a children's room, yet half worried at not having them close by. In such cases, what is the anxious mother to do? Must she keep the hall doors open both from her chamber and from the nursery, thereby allowing all the noises of the house to disturb the occupants of both rooms? Or shall she tiptoe occasionally to the children's room to see if all is quiet there? In either case, the mother's sleep would be considerably broken.

Here again, an electrician has come to the rescue with a simple solution which ought to bring added comfort to thousands of homes, says *Popular Electricity*. He places a telephone transmitter with its battery on a shelf in the nursery, high enough to be well out of reach of the children, and runs wires from it to a receiver hung beside the mother's bed. During the day, a switch at the receiver cuts off the telephone circuit so that no sounds will be carried by it from the nursery. But at night, the switch is turned on and the mother can at once settle down to a sound sleep, knowing that if a child should cough or become restless, she would immediately hear it, even though the hall doors to the various rooms are tightly closed.

One on the Rector

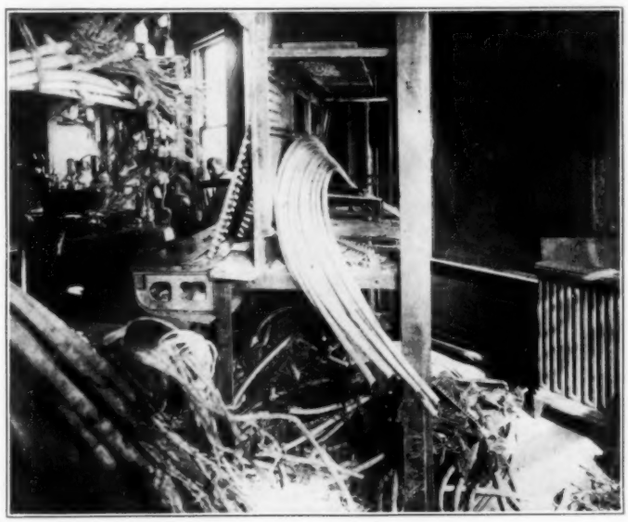
An Episcopal clergyman, rector of a fashionable church in one of Boston's most exclusive suburbs, says *Everybody's*, could not be bothered with the innumerable telephone calls that fall to one in his profession, so he had his name left out of the telephone book. A prominent merchant of the same name, living in the same suburb, was continually annoyed by request to officiate at funerals and baptisms. He went to the rector and told his troubles in a kindly way and asked the parson to have his name put in the directory. But without success.

The merchant then determined to complain to the telephone company. As he was writing the latter one Saturday evening, the telephone rang and the timid voice of a young man asked if the Rev. Mr. Blank would marry him at once. A happy thought came to the merchant. "No, I'm too d—n busy writing my sermon," he replied.

The Telephone Scrap Book

Restoring an Exchange After Fire

THE accompanying two photographs show conditions and progress of work in restoring service after a fire in the exchange of the United States Telephone Company at Youngstown, Ohio.



Last Section of Switchboard Moved from 30 Degree Angle to Make Room for Splicing.

During an electrical storm, fire started in the last or unequipped section, where the multiples were spliced and the ends sleeved. It was the same old story; excited operators, the janitor extinguishing fire with water when Pyrene was right at hand.

Splicing of Multiple Cables Partially Completed.

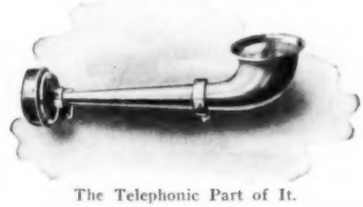
This is one of the first installations of the series multiple type board manufactured by the Stromberg-Carlson Company. The multiple consisted of eighty 40-pair cables, and work of restoring service was started early Saturday morning and all lines were working by 4:30 Monday afternoon.

The color code in these cables was badly faded and one of the remarkable incidents of the work was that one of the men who is deprived of the use of one eye, picked colors and made better progress than men with good eyes.

Helping Moving Pictures to Talk

TIME and time again moving picture plays have made use of the telephone as an actor, playing a more or less important part in the working out of the dramas portrayed. In fact, the telephone has come to be such a factor in everyday life that there are very few plays of any sort which do not utilize it.

The telephone has now taken another part in the moving picture industry. It is now used to help the "movies" to talk. Thomas A. Edison's latest invention, the Kinetophone, probably more popularly known as the "talking moving pictures," is a combination of film and phonograph, both of which, in great measure, have come to be known as Edison's own. In producing these talking pictures it is, of course, essential that the film reel and phonographic record should be absolutely synchronized. That is to say, when the actor's lips form a word, that word must be reproduced by the phonograph at that instant, otherwise the effectiveness of the combination is entirely destroyed. This would naturally not be a very difficult matter if the reel and phonograph could be placed next to each other on the stage; but as the moving picture machine is invariably placed back of the audience in what is known as the "operating booth," this is not possible. Furthermore, this booth is usually entirely enclosed, with only a few openings for ventilation, and other openings through which the pictures are projected upon the screen, and it is manifestly impossible for the operator to hear the phonograph clearly, if at all. On the other hand, the phonograph must be placed on the stage.



The Telephonic Part of It.

These facts have made it necessary to introduce a means of synchronizing the pictures and records. After a number of methods were tried out it was found that by making use of an intercommunicating telephone system the best results were obtained. At all moving picture and vaudeville houses where the talking pictures are shown, the two attendants—the one operating the reels and the one operating the phonograph—are connected by means of a special three-wire private line circuit. At each end of the line a Western Electric No. 1001-E Inter-phone hand set affords a means of constant and instant communication between the two men and in this way enables the operator of

the picture machine to synchronize the pictures with the phonographic record. This type of hand set was chosen inasmuch as it is especially adapted for this class of service on account of its being practically indestructible. In addition to the hand sets, a push button and buzzer are installed at each station for signaling.

As a further aid to the moving picture operators, the Edison Company is furnishing them with Western Electric No. 153-W double head receivers, which act as an auxiliary for the hand set. This makes it possible for the machine man to attend to his work and still be in constant communication with the phonograph man and able to hear what he has to say at all times.

The Kinetophone made its first appearance early in March and has already come to be looked upon as the logical successor to the wordless film drama. As a result of its invention, the words and actions of the leading players of the world can be handed down from generation to generation and thus provide instructive and pleasing entertainment for years to come.

Application of Hyperbolic Functions

THE fifth and last of Dr. A. E. Kennelly's lectures on the application of hyperbolic functions to electrical engineering, delivered under the auspices of the Brooklyn Institute of Arts and Sciences at the Polytechnic Institute, Brooklyn, N. Y., and reported by *Electrical World*, dealt with "The Application of Hyperbolic Functions to Telephone Lines, Both Loaded and Unloaded." In this application of these functions, said Dr. Kennelly, there is great advantage over other methods of computation and analysis. In the first place, telephone lines are usually long and subtend much larger hyperbolic angles than energy transmis-

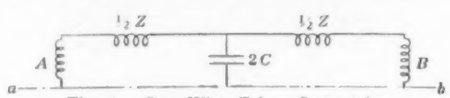


Fig. 1. One Wire Taken Separately.

mission lines. In the next place the frequency is not fixed, but variable, and the practical range is from about 100 to 2,000 cycles per second. Thus it is necessary to employ the full theory of linear circuits possessing uniformly distributed resistance, inductance, capacitance and leakance. The speaker first spent some time in explaining the characteristics of telephone receivers and went over some of the details of the experimental researches conducted by Dr. G. W. Pierce and himself and reported at the Dundee meeting of the British Association for the Advancement of Science last fall.

While the range of frequencies in telephony is given above, it has been found that so far as practical results are concerned a telephone line behaves as though a single frequency of about 800 cycles, or 5,000 radians per second, were impressed upon it, and calculations of effective attenuation can be carried out on this assumption. Naturally, however, this applies solely to the calculation of the effective attenuation and reveals nothing in respect to distortion. While a single T section or Π section of an artificial line may be constructed to represent a telephone line at one frequency, say 800 cycles, it cannot represent it at all frequencies unless the section is comparatively short. Hence long artificial lines must be made up of successive short sections.

The speaker went over the principal characteristics of uniform lines in some detail and then took up loaded lines, showing how Campbell's formula can be derived by a brief method. Characteristic curves giving the effect of changing the number of loads or coils per wave-length were presented, showing that with seven or eight coils per wave the difference between a loaded line and a uniform line of the same total constants becomes negligible. In conclusion the speaker took up the subject of losses at the junction of two dissimilar telephone lines, caused by wave reflection.

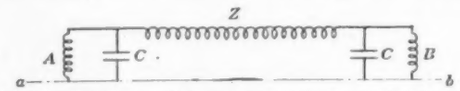


Fig. 2. Line Regarded as Containing Two Condensers.

The same phenomenon occurs at the terminals of a line, especially in the case of loaded lines. In the last instance special transformers have been successfully used, and also terminal tapers which contain graduated reductions in the loading. When two dissimilar lines are joined together to form what the speaker termed a composite line, as when an aerial circuit of open wire joins an underground circuit in cable, there is an abrupt change in surge-impedance and the equivalent T line or Π line becomes unsymmetrical. In his closing remarks the speaker stated that hyperbolic functions have a distinct place as one of the tools of engineering and voiced his opinion that within a few years' time, after complete tables of such functions are available, they will be employed universally.

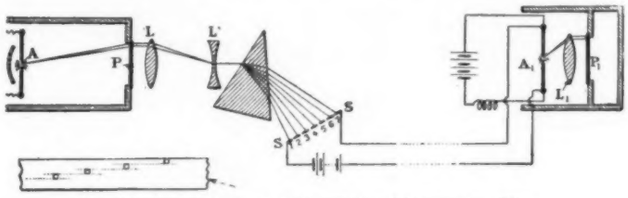
Color Photographs by Wire.

IN a recent number of *Lumière Electrique* M. Marino explains his system of telephotography in black and white and in colors. Selenium si, of course, used, as in most telephotographic systems. It will be recalled that in the Korn process, the transmitting element is a selenium cell, selenium being a metal the electrical resistance of which is a function of the luminous intensity to which it is subjected at any given moment. Marino employs not one cell, but a battery of seven cells, each responsive to a single color —red, orange, yellow, green, etc. In transmitting pictures in black and white each cell responds to the particular radiation to which it is sensitive. In transmitting pictures in colors they transmit the fundamental hues of the original, decompose them at the transmitting station, and recompose them at the receiving station.

At the transmitting station the photographic plate *P*, the colored picture on which is to be transmitted in black and white, is illuminated by an electric arc *A*. Each ray of light after passing through the plate falls upon a convex lens *L*, by which it is refracted to the concave lens *L'*, by which in turn it is thrown on a prism. The prism analyzes the the ray into its fundamental spectrum colors, and the various colored rays in turn fall upon the corresponding selenium cells S^1, S^2 .... S^7. The cells are so mounted that rays of a particular color will always fall upon the proper cell. The cells are included in the line circuit leading to the receiving station. Their total conductivity is equal to that of a single cell receiving composite light. The effect produced at the receiving station, because

of the variable conductivity of the entire battery of transmitting cells, is proportional to the amount of light received from any point of the original image at a given moment.

The original photograph is decomposed point by point by regularly displacing across the photographic plate an opaque ribbon perforated with very fine holes, arranged in step-like series so that the upper edge of the second lies at the level of the lower edge of the first, etc., as shown. Each perforation as it passes across the plate permits the passage of a horizontal



The Marino System of Telegraphing Pictures in Colors.

band of light from the arc behind the plate. The horizontal distance between two consecutive holes or perforations is such that one perforation at a time passes across the plate, and that an appreciable interval is allowed between the exploration of the plate by the two ribbons. During this interval the selenium cells are at rest and are thus enabled to lose their residual conductivity, which they tend to preserve as the result of a well-known effect of inertia or hysteresis. Because the intensity of the light is distributed among all the selenium cells, each receiving but a part of the light resolved by the prism, the hysteresis is considerably diminished. At the receiving station a short length electric arc A' is to be found, to which a very weak direct current is supplied. The arc is connected with the line circuit and hence with the selenium cells. The variations in resistance of this circuit have a very marked effect on the luminous intensity of the arc, although that effect is not noticeable to the eye. These variations in light fall on a photographic plate P', in front of which an opaque ribbon pierced with holes or openings identical with those of the transmitting ribbon is displaced synchronously with that of the transmitting station. the sensitive plate is affected in such a manner as to reproduce the original together with all the gradations in color and tone.

It is, of course practicable to transmit not only a colored photographic transparency, but also the image of any fixed object reflected by a mirror. The perforated ribbon passes over the reflection exactly as in the case of the photographic plate.

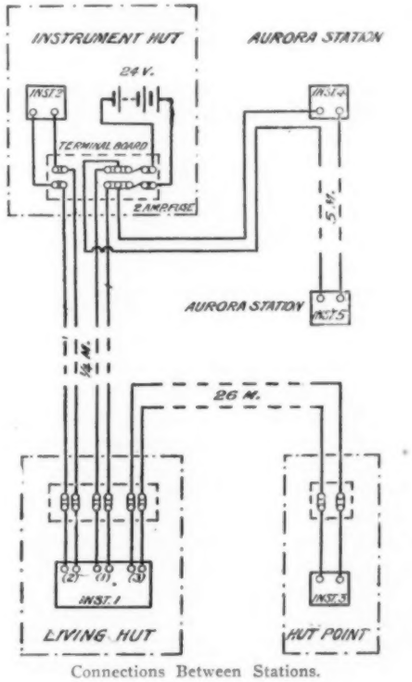
In transmitting photographs in colors the seven cells of selenium instead of being mounted in parallel on a common circuit, are divided into three groups, each of which form part of a circuit of a Poulsen arc, generating waves of varying length. At the receiving station three waves detectors included in three resonating circuits (each of which has a frequency corresponding with that of one of the set of waves emitted by one of the Poulsen arcs) influence three receiving arcs, in front of which colored filters are mounted corresponding with the three groups of selenium cells. The three sets of colored rays emanating from the three arcs are concentrated by lenses on a sensitive autochrome plate, explored in the manner already explained, by an opaque perforated ribbon, so that each point is allowed to exert its influence, while at the same time the corresponding point of the original is illuminated by an opening in the perforated ribbon of the transmitter.

By superposing the impressions made by three sets of colored rays, the shades and intensities of the original are exactly reproduced in their proportionate intensities. When the original has been completely explored by the perforated ribbon the receiving plate has completely responded. Developing is the next step.

Captain Scott's Telephones

THE following brief description of the telephone equipment taken to the Antarctic by Capt. Scott's expedition, and detailed in the London *Electrical Review*, may be of interest to our readers. The installation was supplied by the National Telephone Company in order to enable communication to be maintained between the winter living quarters and the outside stations of the expedition. Five stations were provided for—the Living Hut, Instrument Hut, Hut Point, and two Aurora stations—and the instruments for these stations were numbered respectively from 1 to 5. The Aurora stations were to be set up for observations of the Aurora Australis, and for this reason were required only to intercommunicate, while the living quarters were required to communicate with both Hut Point and the Instrument Hut.

On account of the extremely low temperatures to



Connections Between Stations.

which the instruments would be exposed, it was impracticable to use any form of dry cell for local batteries, and after several experiments it was decided to make use of a 24-volt battery, forming part of the scientific equipment of the expedition, as a common battery for the different speaking circuits, in which the receivers and transmitters were in series in the line. This arrangement had the advantage of great

simplicity, and with Ericsson hand-microtelephones was found to give good transmission. The ringing was by magneto-generators. Each instrument was self-contained in a stout wooden case, to obviate the necessity of packing for transport.

The line wire was of bare hard-drawn aluminum, No. 19 s. w. g., supplied by the British Aluminum Company. The question of weight was of great importance, and as the conductivity and strength of the wire would be improved by the temperature conditions of the polar regions, this material was selected. The total length of wire carried was about 75 miles, wound upon six iron drums, suitable for mounting on sledges, from which it would be laid direct on the ground. The go and return wires were specified to be not less than 6 feet apart, and it was considered that the clean, dry snow would be an excellent insulator, even on the longest lines. This is proven to be the case in practice. For jointing the wire aluminum McIntyre sleeves were provided.

The Telephone and the Telegraph

By Union N. Bethell*

IN St. Pauls Cathedral, near the last resting place of Sir Christopher Wren, the architect of that magnificent structure, there is a simple tablet bearing the injunction that if you demand Sir Christopher's monument, look about you. Today, if you demand the monument of the Telephone Pioneers of America, look about you.

Behold a highly developed and well organized system of communication touching human activity at every point—an essential factor in the social and industrial life of the nation—cities, towns, villages and hamlets, though widely separated, farms, factories and firesides everywhere intimately bound together by countless avenues of speech. Through the magic of this wonderful system the hours of the day are multiplied and the work of the world is immeasurably accelerated. The incessant exchange of information and ideas which this system makes possible, puts individuals and localities on common ground—sweeps away sectional prejudices—advances civilization.

While the telephone, together with other methods of communication—the railway, the mail and the telegraph—have been the means by which the occupation and civilization of this great country have been accomplished, the telephone has provided a facility peculiar to itself, in that, over areas great and small, it has made it possible, by spoken word, to bring together—mind to mind—the vast majority of the American people. This service of the spoken word not only affords a means of communication between distant points, but attains, as nothing else has done or can do, the actual presence of one mind, one personality, with another—a practical annihilation of distance. Can we wonder that such a service, full of promise always and to which nothing now known can be compared, has been the means of developing a great national enterprise, spreading from sea to sea, and engaging the energies and commanding the devotion of a loyal army nearly 135,000 strong?

As we all know, here in the land of its birth the telephone has attained its greatest degree of usefulness. Here the broadest and best foundations were laid and here the grandest superstructure has been erected.

That America leads in the appreciation and use of the telephone is evidenced by the fact that here in our country there are more than two-thirds of all the telephones in the world. In America, too, the telephone carries nearly sixty per cent of all communications by mail, telegraph and telephone combined, while for the rest of the world the telephone can be credited with less than twenty-five per cent of the total.

In the progress of the art, also as well as in the efficiency of the service, America leads and has always led all other countries. Here nearly every one of the important plans and appliances for exchange or long-line work has been invented and developed. The scope of the service is indicated by the fact that while in the United States there are about 25,000 telegraph offices, 60,000 railway stations and 65,000 post offices, the telephone reaches approximately 70,000 communities. By the end of 1912 the total of Bell telephones scattered throughout our country will approach, and perhaps reach, the phenomenal figure of seven and a half millions.

In the operations of the Bell system, a peculiar relation to the public exists, in that Bell representatives—Bell operators—are making direct verbal reply to the requests of patrons more than twenty-five million times each day. No other service, for intimacy with its patrons, can be compared to this, but in spite of its extent and the necessary intricacy of its details, the telephone operator of America is each year, I believe, more and more appreciated for her courtesy, patience and efficiency. Today, courtesy to the public and to one another on the part of all is generally recognized in the system as a *sine qua non* of success, and while perfection has not been attained, there is a cloud of witnesses to show that the general belief on the part of the public is that the nearly 135,000 Bell employes, men and women, are striving earnestly and conscientiously to render throughout the country a dependable, a courteous and an increasingly valuable service.

Moreover, this great army, working in the spirit of fairness to each other, and fairness to all, has not only carried on the telephone service of the country, but has developed within itself such ideas of mutual helpfulness and such a broad recognition of responsibilities as have made possible continued welfare work of the highest order, and, finally, such carefully worked out plans for accident and sick benefits, for life insurance and pensions as will, in a multitude of cases, furnish substantial and practical relief and assistance as a just and honest due for faithful service. Through united effort this great army has made a remarkable record in social progress and achievement.

While everywhere throughout the world the telephone has attracted to its service men of high ideals and marked ability, and in numerous places splendid results have been obtained, yet, because of their unique achieve-

*Address before the Telephone Pioneers of America, New York, November 14, 1912.

ment, the whole world unites in awarding the place of honor to the telephone pioneers of America.

One can scarcely conceive, however, of a well founded, comprehensive and ideal system for the electrical transmission of intelligence without bringing within the scope of his vision both the telephone and the telegraph. The binding together of these two great agencies that they may work harmoniously, hand in hand, in the public interest, is well under way, and the resulting benefits are almost universally recognized and commended. For years, in a clumsy and ineffective way, efforts were made to bring the telephone and the telegraph into complementary relations, but the results were meagre and unsatisfactory. Today, however, swift progress is being made towards complete and cordial co-operation. Wireless telegraphy, too, is taking her place as a helpful handmaid.

Only a few months ago the people of this nation chose a president. About 15,000,000 votes were cast, at thousands of polling places scattered from the forests of Maine to the Golden Gate, and by ten o'clock that night the net result of all this widely distributed voting was known on every city street corner and at almost every cross-road in the country. A wonderful work in which both telegraph and telephone had an honorable part!

Last spring a mighty ship, the giant of her day, sailed on her maiden voyage. Steaming swiftly, on a starlight night, she crashed into a mountain of ice which sent her to the bottom with 1,500 souls. Intelligence of the disaster transmitted by wireless saved many lives and much suffering. And then the eyes of the civilized world, as well as its heart throbs, were concentrated on the ship of rescue. There were sorrow for the afflicted and an eager longing for definite news of those who were lost. The telephone, the telegraph and the cable enabled the peoples of many lands and many climes to stand together in sympathetic unison, to share a common grief and to join in praising a marvelous display of heroism.

And so every event of world-wide human interest —through the operations of these combined agencies— presents a vision of the Brotherhood of Man.

A very distinguished German, addressing the Society of Electrical Engineers in Berlin, recently said:

It is the telegraph and the telephone which have enabled us to solve the principal problems of communication, the conquest of space and time, in a manner so perfect that the very imagination could scarce surpass it. The security and rapidity of the electrical transmission of news has attained a development hitherto unknown and hardly dreamed of, and since all civilization rests upon the intercourse of individuals, and this intercourse depends on an exchange as rapid as possible of ideas and experience, we instantly recognize here the civilizing influence of electricity.

To fully appreciate what the electrical transmission of intelligence means as a factor in social and industrial progress, we must look back to a time when it did not exist. Let us confine ourselves to our own country and to the period covered by its life as an independent nation. Let us put on our seven-league boots and starting about the time when our forefathers broke away from the mother country, come bounding down the years, stopping at only half a dozen points or less to glance about us.

When Lord Cornwallis surrendered his sword to Washington at Yorktown, in 1781, a ship was dispatched to carry the news to England. The ship—so history tells us—compared with other ships of its day, was a "swift ship." The news was bad news—and bad news, we all know, travels as fast as it is possible for news to travel. And yet 37 days elapsed before the evil tidings reached Lord North in Downing Street and caused him to wildly walk the floor crying: "My God, it is all over—all over!"

A third of a century later, in 1814, at the close of the war of 1812, a treaty of peace was concluded at Ghent, but the means of communication between distant points were still so limited that two weeks later the bloody battle of New Orleans was fought—and the news of Jackson's victory and that of the conclusion of peace reached Washington, some two or three weeks later, at about the same moment.

Throughout the next thirty years intelligence continued to be transmitted between distant points only by the hand of man. During this long period of sixty years or more our country had grown to immense proportions, particularly by the acquisition in 1803 of the Louisiana Territory—then a wilderness, now a mighty empire. Statesmen here and in England strongly felt that so vast a country could not be governed or held together, and yet in 1843 some bold and courageous spirit seriously proposed the acquisition of the far-away Oregon Territory. This proposal aroused strenuous opposition, particularly in the United States Senate. Senators asked what interest could we have in a country so remote, so far away that its representatives would consume their entire time in going to and from the national seat of government? What interest could we have in a country to communicate with which it was difficult and dangerous and almost impossible? And then, in the very next year, 1844, there came across the electric wires those thrilling words: "What hath God wrought?"

There was the dawn of a new era—and those now historic words are linked forever with the name of that benefactor of his race who gave to the world the telegraph—Samuel F. B. Morse.

Let us hurry on. Another third of a century is spanned and we stop to look about. In passing we may have observed that during the early part of this period disconnected telegraph lines were built here and there, and that at length they were gathered together to form a connected system and that cables were laid from continent to continent.

The world was moving along quite merrily in an era of progress and development unlike anything that had gone before—the era of the electrical transmission of intelligence—but we stand now upon the threshold of greater things, for our third-of-a-century leap has brought us to 1876.

A young Scotchman of rare ability and pleasing personality had been working diligently to ameliorate the condition of the deaf. In the course of his work he invented an instrument which was carried to Philadelphia to be exhibited at the Centennial Exposition. He himself has told you in his simple and fascinating way the wonderful story! At length, you know, when this little instrument was being examined by certain learned men—by certain great men—one of them, amazed and astonished, exclaimed: "My God, it talks!"

Who can name the day when mankind will forget to honor him who gave to the world this priceless boon —the telephone—forget to honor the name of Alexander Graham Bell?

One more stride of thirty years, or thereabouts, brings us to the end of our journey. And what a fascinating and marvelous period has this last stride cov-

ered. All along the way we have seen swift changes in the art, rapid growth, tearing out old, putting in new, transforming, expanding, developing, improving—training and educating men and women, training and educating ourselves, not only in the technique of our profession, but in business ethics and in our duties to the public we serve, and to one another.

But here and now I shall speak only of one important work which stands out pre-eminently as the milestone which marks the end of the journey we have made—the relation which is being brought about between the two great agencies—the telephone and the telegraph. These two are and always have been alike in this one respect—that intelligence is transmitted by them electrically over wires. The telegraph did not at first welcome the telephone. For a time there were jealousy and fear. A great telegraph company embarked upon a venture to protect itself from and to hurt what it thought was an adversary. But before long it was found that the two did not interfere, and quarreling was stopped, but they nevertheless went their separate ways, not realizing how helpful each could be to the other. In the course of time, however, one who was familiar with the problems of both, who knew both at first hand by actual and long extended experience—a man sagacious, broad-minded and courageous—saw the waste of facilities, the neglected opportunities of increasing the usefulness of both by harmonious co-operation and mutual helpfulness. He set about to accomplish the realization of a dream and now after his manner is leading us to its accomplishment.

We stand now at the threshold of an era—as we did when we stopped to note the beginnings of the telephone and as when further back we stopped to note the beginnings of the telegraph. And what commanding figure do we behold? An active and alert leader in a great undertaking—one whose name will ever be associated with those of Morse and Bell—the president of this association—Theodore N. Vail.

Glancing back over the years that have passed since the advent of the telephone, we see numerous and radical changes in types of apparatus and lines, in operating methods, and in the practices that have pertained in all branches of the industry. In the matter of physical development and improvement, consummate skill and ingenuity on the part of engineers and operating officials have solved many perplexing problems as they have arisen and continuous progress has been the result. Formidable commercial problems have always been present. In our large cities perhaps nothing has had so profound an effect on growth and expansion as the development of the message rate principle. In such cities, under flat rates, a point was early reached when growth was retarded, facilities overloaded, and the efficiency of the entire system seriously impaired. The adoption of the message as the unit of measure with charges graduated to the requirements of all classes of users afforded relief to the public, made an improved service possible, and introduced a degree of equity not previously found in any plan of rates. The solution of the whole complex problem—the working out of a complete and comprehensive plan—required the highest degree of business skill and cannot be credited to any individual, for it was the work of many minds and the result of wide experience in many quarters. The original idea, however, as applied at a very early day in Buffalo, was one of the many valuable contributions made to the development of the industry along broad lines by Edward J. Hall.

There has been no absence at any time of financial problems of considerable magnitude. To raise from time to time as needed, the enormous sum of more than $700,000,000 has been no simple task. To receive, safely keep and disburse the vast sums that have passed through our treasuries has been a work of gigantic proportions, done skillfully and with a wonderful degree of accuracy and integrity. To formulate and follow a system of accounts that would afford reliable and trustworthy sailing charts for those charged with the responsibility of management and at the same time give to the public and the constituted authorities the information they should have has been a continuous and at times difficult problem.

In dealing with public authorities, to avoid the enactment, through prejudice and lack of correct information, of hard and fast laws that might hobble a rapidly-growing and ever-changing industry, to secure fair and reasonable ordinances and other legislative enactments, diplomacy of no mean order has been required. To avoid unnecessary litigation and dangerous pitfalls of many sorts, to sail the difficult course that leads to great size and a universal service and yet involves no infraction of the law, has called for the guidance of the best legal counsellors.

In the annals of the Bell system there is material for a thousand romantic tales of individual loyalty and fidelity to duty on the part of linemen, wiremen and others, and of bravery and heroism on the part of operators.

So, as we look about us and we look back over the past, we see that no one man and no set of men has solved all the problems or accomplished all that has been done. As the stars differ in glory, so we may differ in the value of our respective contributions to the general result, but of the general result, it is safe to say, as was said of the victory at Santiago: There is glory enough for all.

And we must not forget those who, after loyally contributing of their best to the work in which you and I are still engaged, are no longer with us. Their lives in many cases were marked by an unselfish devotion to duty and an adherence to high ideals and noble aims throughout long years of strenuous toil. We honor them all—and each of us no doubt treasures in his heart the recollection of splendid attributes possessed by some particular comrade whom we will not see here again. One of the charming characteristics of this industry is that we who are in it and of it are as members of one big family.

To secure greater uniformity in operating methods throughout the country, a more effective general administration, and greater ease in financing, the twenty or thirty operating divisions of the Bell companies which once existed have been concentrated into grand divisions with administrative headquarters located in eight or ten of our principal cities from each of which information and instructions are passed to the executives in the divisions or districts within the general area administered from such city.

We are now better able than ever before to discuss plans, consider measures and determine from the combined experiences of all what is best for the several branches of the service. Besides obtaining uniformity in practice, there has been provided a more ready means

of developing ideas and suggestions for future improvements. Greater than ever before is the opportunity for individual initiative. The time never was and never will be when the stability and the progress of this vast enterprise has depended or will depend on the strength, the energy and the intellectual ability of any individual or small group of individuals. The virility and vigor of the organization as a whole has depended, and will continue to depend, on the virility and vigor existing throughout the mass and permeating all its parts. A great and successful leader among us is he who inspires and encourages, and who rightly uses the spirit which wells up to his hands from the myriad of springs whose sources are found among his loyal followers. Moreover, as has been demonstrated time and time again, especially in recent years, every soldier in this Bell army carries in his knapsack a marshal's baton.

Some of us find comfort in looking to the years that are behind us, while others find their chief delight in looking to the future. I congratulate you all—to those looking to the past because of the high and honorable nature of the work with which you have been identified —to those looking to the future because of what lies before you in its further development. The character of the work you know full well. It has made and is making the world a more cheerful and better place to live in. The transmission of intelligence by electricity is an active and effective agent in the advancement of civilization throughout the world.

To emphasize this fact, and, in conclusion, I shall read a brief extract from a speech made by Secretary Knox, in Tokio last September, upon the eve of his departure from Japan. Mr. Knox said:

> There is today a decided impulse towards social coordination that must become a real cosmic force. Through the marvelous modern development in the means of communication each nation promptly feels the influence of the public opinion of all nations. As nations understand each other better and the world draws closer together in the recognition of a common humanity and conscience, of common needs and purposes, there is carried into the international field the insistent demand for greater unity in enforcing everywhere the principle of a high morality, and, by restraints mutually applied and observed, all the human ameliorations without which both the national and international life would soon fall into anarchy and decadence.

Constantinople's Telephone System

Vice Consul General Oscar S. Heizer, Constantinople, Turkey, reports that the concession for the Constantinople telephone system was put into adjudication in 1909, and the 14 competing syndicates were eliminated one by one until finally there remained only the Anglo-Franco-American group (composed of the Western Electric Company, the British Insulated & Helsby Cables Company, the Thomson, Houston Company, of Paris, and the National Telephone Company), to which the government granted the concession in April, 1911, after it had been accepted and ratified according to Ottoman law. Before granting the concession, however, the advisability of the system being constructed by the government itself was considered, but it was finally decided that it would be more practicable to grant the concession to a group of foreign telephone companies with the privilege of purchasing the property at a later date.

The concession is for 30 years from the date of the signing of the contract. Under its terms the government grants to the concessionaires the exclusive right to construct and operate telephone lines within certain districts, with the exception of state, municipal, and lines entirely within private property, which have already been installed. It was stipulated that the plans and estimates of the company were to be submitted to the government within six months and the system was to be completed and in operation within 1½ years after the acceptance by the government of the plans and estimates.

All materials to be used in the original construction work are allowed to enter free of duty, after examination by a government commission as to their quality and adaptability. As soon as the system is in operation the government will proceed with the preliminary inspection; and after it has been in operation for one year, the inspection to determine the government's final acceptance will take place.

In return for granting the concession, the Ottoman government will receive 15 per cent of the gross profits of the operating company. A feature which has not hitherto been a part of concessions of like nature granted by the state is that the Ottoman government, besides participating in the gross profits, will also receive from the telephone company $3.35 a year for each mile over which lines are operated and $4.06 for each square yard of property occupied by the company buildings. Within six months of the signing of the imperial firman the concessionaries were to organize a joint-stock company subject to Ottoman laws, with an initial capital of at least $1,100,000 and bearing the name of Société Anonyme Ottomane des Téléphones de Constantinople.

According to the terms of the concession the government has the right to purchase the property 10 years after the signing of the imperial firman. If, however, the government has not taken the property over at the end of 30 years, the concession will be prolonged for another 10 years under the original conditions of the contract. The company will have the right to employ foreign technical experts during the first 10 years of the concession, but it will be required to send Ottoman subjects to Europe for technical instruction and, furthermore, to establish a telephone school at Constantinople to be maintained for the same purpose.

The causes whereby the concessionaries would be liable to the forfeiture of the concession are, excepting force majeure, the following: Failure to present the plans and estimates as agreed; failure to undertake the work of construction at the stipulated time; the abandonment of the work; the interruption of service over any one of the three central exchanges during a period of five years or longer; and the nonfulfillment of one or more of the obligations of the concession. In the event of the occurrence of any of these, three successive notices at intervals of three days will be sent to the company by the government authorities, and if the former does not comply with the requests of the government within a period of 10 days after the issuance

of the last notice the concession reverts by forfeit to the latter.

If construction continues as rapidly as it has up to the present time, it is hoped that telephone communication will be opened over all the lines by August, 1913. The service will cover both the European and the Asiatic sides of the Bosporus and of the Marmora as far as Pendic on the Asiatic coast and San Stefano on the European coast, and will also include the Princes Islands in the Marmora about 10 miles from Constantinople.

There are to be 16 central offices, one main exchange each for Pera, Stambul, and Kadikeuy, and 13 substations located on the Princes Islands and at various points along the Bosporus. The Pera station, which is under construction in Rue Tom-Tom opposite the Austrian consulate general, will cover all points in Pera and in Galata up to Couroutchesme; the Stambul station, also under construction, will operate over the Turkish quarter of the city as far as Ali Bey Keuy on the Golden Horn; and the station in Kadikeuy will cover Scutari, Moda, Kadikeuy, and other points on the Asiatic side of the lower Bosporus.

The 13 substations are located as follows: Bebek, Therapia, and Buyukdere on the European side of the Bosporus; Erenkeuy, Candili, Pasha-Bagtche, and Kartal, on the Asiatic side; Makrikeuy and San Stefano on the European shores of the Marmora; and the islands of Proti, Antigoni, Halki, and Prinkipo, which compose the Princes Group.

Up to the present time, out of a total of 205 kilometers (127.4 miles) of cable, which will cover an area of 300 square miles, 15 kilometers (9.3 miles) have been put in place. The construction work will consist of both underground and aerial cables according to the district through which the wires pass. The cables will be dry core paper insulated, the underground ones being drawn into castiron pipes, bonded through all manholes and chambers, and the aerial lines being drawn into metal rings which are clamped to the steel-strand suspender wires, this latter idea being copied from recent American practice. The cables contain 500 to 600 pairs of wires and are made in lengths of 200 to 800 meters (656.2 to 2,624.7 feet), according to the size of the cable and the most economical shipping lengths.

The construction work has been turned over to an English and an American company; the British Insulated & Helsby Cables Company (Ltd.), of Prescot, England, is furnishing the materials and equipment for the outside work, and the Western Electric Company of Chicago is supplying the interior apparatus. The city of Constantinople will, therefore, be equipped with switchboards, telephone boxes, batteries, etc., of up-to-date American pattern.

The technical staff of the company, which now consists of 30 men, all of whom are foreigners, will be replaced by natives as soon as the system is in good working order. About 500 natives are employed by the contractors in laying the cables and in doing other outside work.

Up to the present 2,900 subscribers have been secured—1,200 in Pera, 1,200 in Stambul, 200 in Kadikeuy, and 300 at other points along the Bosporus. It is of interest to note that 25 per cent of these subscriptions are for Turkish private dwellings. Another interesting feature of the Constantinople telephone service is the fact that, owing to the many tongues spoken in Constantinople, all the telephone operators will be required to know at least three languages—French, Turkish, and Greek—and there will be in each central exchange operators who speak German, English, Armenian, Spanish, and the Slav languages as well.

The company's rates are divided into two schedules (1) for commercial, industrial, and transportation companies, stores, etc., and (2) for apartments and private dwellings. To the first class of subscribers two kinds of service are offered: (1) For a central line, with the right to 275 conversations, a minimum of $12.10 per semester (half year) is charged; for messages in excess of 275 per semester the rates are $2 for 50 conversations, $6.60 for 150, $11 for 250, and on up to $44 for 1,450 excess conversations. For 1,450 to 1,950 excess messages the rate is $2 per 100 conversations; 1,950 to 2,450, $1.60 per 100 conversations; 2,450 to 2,950, $1.20 per 100 conversations; above 2,950, $1 per 100 conversations. (2) For a private switchboard with two or more main trunk lines and interior branch lines running to different parts of the subscriber's establishment, the cost of installing each central line is $8.80 per semester, and for each branch $2.20 to $3.30, according to the number of booths. The charge for service with a private-switchboard installation is: For a minimum of 1,500 conversations, $26.40 per semester; 1,500 to 3,000 conversations, $1.60 per 100 messages; 3,000 to 4,000 conversations, $1.40 per 100; 4,000 to 5,000 conversations, $1.20 per 100; above 5,000 conversations, $1 per 100 messages.

Subscribers in the second category may choose either a central line, with the privilege of 250 conversations, at a minimum rate of $11 per semester, and charges for excess messages that range from $3.60 for 100 conversations to $28.60 for 1,000 conversations, the rate above 1,000 being $2 per 100 conversations; or a flat rate of $17.60 per semester for a central line with unlimited service in the same district.

The zone of telephone lines is divided into two districts—the European district, and the Asiatic district, which includes the Princes' Islands. For each conversation from one district to another flat-rate subscribers are charged an extra tax of 4 cents.

The duration of all subscriptions is for one year. In case the subscriber has not used all the conversatoins which he has purchased in advance for the year, the company will reimburse him for all such unused conversations above the minimum number allowed.

Oklahoma Commission News

The Apache Telephone Company has made application to the Oklahoma Corporation Commission for permission to increase its rates for service to subscribers. The petition is signed by a large number of the patrons of the company. The rates at present are $1.75 per month for business and $1 for residences and the company asks permission to increase the rate 25 cents on each class.

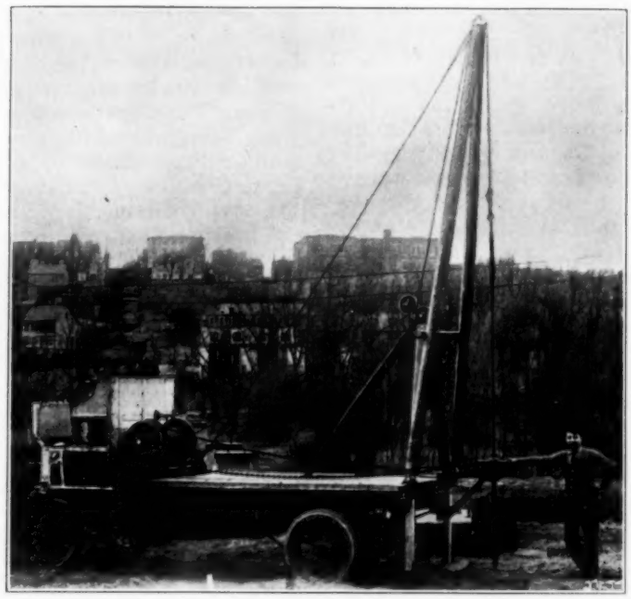
California Commission News

The California Railroad Commission rendered a decision denying the application of the Saratoga Telephone Company to increase its rates, and directed that the Pacific Telephone & Telegraph Company proceed to render service in and about Saratoga at the rates on file with the commission.

The Economy of Motor Trucks

By R. W. Hutchinson

THE first question that is asked a motor truck representative by at least nine-tenths of business firms who are thinking of installing motor trucks is, "How much money will a motor truck save me over my horse vehicles?" The almost invariable answer is that "It depends on so and so." The qualifying conditions are enough to bewilder any business man seriously seeking enlightenment on this important problem. The truth is, however, that no honest motor truck representative can truthfully say a motor truck substituted for a certain number of horse teams will effect a saving in dollars and cents which can be guaranteed in round figures. Some truck manufacturers have attempted to do business on a basis of guaranteed operating expenses for their motor trucks and guaranteed maintenance expense and guaranteed economy in accomplishing the equivalent or greater amount of work over the horse equipment, but it is safe to add that every one of these companies has gone the way of every enterprise which was not established on safe, sane and sound business principles. Although no honest motor truck manufacturer will guarantee that his product will cost such and such a figure in a day, nor that the machine transportation will effect an economy in figures which can be carried to even one point decimals, the motor truck manufacturers can prove to the satisfaction of any man that when he needs motor truck equipment and when he operates it in a manner approved by the engineering experts of their organization, the economies will be sufficient to pay a larger dividend upon the capitalization represented by the motor trucks than perhaps any corresponding investment in mechanical equipment.



Special Form of Motor Truck for Telephone Pole Work.

A five-ton gasoline motor truck operating in public service delivery shows a gross profit of from $30 to $50 per day and a net profit of from $20 to $30 per day, figuring that the original investment for the truck was $4,500. No other mechanical equipment can show a profit of 100 per cent per year on its cost, calculating that the good motor truck is available for operation 300 business days in the year. The man who has not actually made sufficient investigation into the earning power of a motor truck is very skeptical as to the truth of a statement that mechanical haulage is showing a profit of from 100 to 200 per cent. But public service motor express companies who are operating and managing their enterprises on the same rigid business principles as are carried out in the cost accounting department, for instance, of the U. S. Steel Corporation are getting such results, and there are a number of truck companies that can prove that under as favorable conditions as these public service motor express companies are operating, it is quite possible for a business concern putting the same time and attention to its use to get a similar ratio of earning. The only reason that the operators of motor trucks are not earning relatively the same ratio of dividends on their investment is that they have mistaken the motor truck in itself as a cure-all for all of their motor truck problems and have not speeded up the inside details of the system to keep pace with the potential possibilities of a motor truck. True, the earning of 100 to 200 per cent on its investment is exceptional profit for a motor truck to show in private use, due to the fact that the public service motor companies can and do charge a larger price per ton or per ton mile for taking care of a merchant's delivery system. However, the profit which a good motor truck would show when operated in private service can and does run as high as 200 per cent on its investment cost.

The economies which motor transportation effect in delivery are seldom measurable on an exact dollars and cents basis, and in saying that the motor truck can, for the use of a private individual or business firm, show a dividend of 100 per cent, we are figuring its earnings on the basis that the first class motor truck will enlarge the delivery area of the owner two or three times and enable him to double or treble his business clientele of customers by making quicker and more prompt deliveries and naturally double or treble profits. If the actual operating cost of a motor truck which has displaced three or four teams was taken as the measuring rule of its economy, it is sometimes the case that the expense will be larger than for the horse teams, but the earning capacity of the motor truck is so much more than that of the horse equipment through its ability to turn out twice or three times as much work, that the actual operating expense bears but an insignificant relation to its earning power. It is not the custom of the business world to place freedom from annoyance and worry incident to delays in delivery of goods on a monetary basis, and yet in truth the absence of the worry which a good motor truck insures in a business organization may have a dividend feature which by itself would make a motor truck a profitable investment even if it accomplished nothing else than to save the energy of its owner for

more productive work in gaining new business and holding it. And in holding new business, the motor truck is the most favorable adjunct in business equipment, as it enables the carrying out of contracts which, if not fulfilled, always jeopardize the future custom from the customer who has been disappointed.

Sufficient facts have now been shown by the motor truck manufacturers to prove that the economy of motor transportation justifies the cost of re-equipment of a delivery system entirely with motor trucks. Perhaps the strongest proof of the economy of motor trucks as a real tangible quantity and not a fictitious estimate of the enthusiastic motor truck representative is shown in the fact that in all of the large corporations in the United States who have adopted the motor truck during the last three or four years and have had in that time ample opportunity in which to determine its economy, there is not a single complaint. If the motor truck had not proven its way these large business organizations, many of which operate their transportation systems in the same efficient and business-like manner in which they operate their manufacturing plants, would have been heard from long before this in denunciations of the motor truck as a failure. It is a most impressive fact that hardly a single one of the large users of power wagons who have put their squadrons of motor trucks on an exact business system of operation and cost accounting have uttered a word, except in the most commendatory terms, of the revolution which the new transportation agency has effected in their business. It is certain that if the large squadrons of trucks which are owned by big corporations were not profitable the business world would have been told so in unmeasured terms by these corporations. The truth is that the owners of the large squadrons of motor trucks are saving so much money in the transportation end of their business that they are silent about giving out any figures showing the economies which their trucks have effected.

In this connection it is interesting to note that there are two classes of motor truck operators. The first class, which is greatly in the majority, keep only such insufficient records as to prove to their satisfaction that their trucks earn a substantial profit. As to the exact amount of this profit they are little concerned, and it is exceedingly difficult for the motor truck manufacturer to glean any cost records from this class of its customers, as the records are so incomplete as to give only the main facts which the owner desires to know—"The truck is earning big money." The second class of truck operators, who are exceedingly in the minority, have kept accurate records of their motor service costs, but they exercise the greatest care in preventing these records from leaving their offices; taking the stand that the longer they keep the information from their competitors the greater the period they can enjoy the advantages which their competitors do not possess, and which enable them to make larger dividends on equivalent capitalization than their competitors. The writer, for example, once asked the traffic superintendent of one of the largest public service delivery companies in the United States for some actual records of his horse and his motor truck equipment. He was met with this rejoinder: "You can't have them. We don't propose to give away this information, as it would start our competitors buying motor trucks, the superiority of our service will be lost, and they would be on an equal footing with us. Just as long as we can keep our competitors from getting these trucks, just so long we will continue to have a certain monopoly. We are not philanthropists and have nothing to give away. If you want any cost records you will have to dig them up from somebody else." This attitude of the successful operators of motor transportation is, of course, in a way a retarding feature to the more general utilization of the motor truck, and if the large corporations would give out some facts regarding the saving these trucks are making for them the smaller concerns now operating from five to one hundred teams would have sufficient confidence in the motor truck to put more faith in the representative's statements and would begin motorizing their systems.

Perhaps no corporation in the United States is better known for the business-like principles in the conduct of every feature of its service than the New York Telephone Company. This company is picked as a model by all progressive telephone service managers throughout the United States. Its sanction of any new wrinkle in business accounting or in business administration is taken as the last word from business efficiency experts. The New York Telephone Company was one of the first large corporations to begin experiments with motor transportation. Its first motor equipment naturally was of the electric driven type, and obviously as a matter of policy and efficiency as well, most of its truck equipment is today of the electric type. However, it has made considerable use of the gasoline truck and has, for example, about 33 Mack trucks of from 1 to 3 tons' size in operation in New York and the suburban territory.

In line with the policy of placing an exact cost accounting system on every part of its equipment, the company began about three years ago to keep the most approved records on each item of cost of the gasoline driven vehicles. The results of this cost accounting system were disclosed by Superintendent of Construction A. W. Allen, in a most interesting report read before the commercial department of his company. Inasmuch as the figures given contain a great amount of information valuable to the business public, the writer is giving them in full in this article, not so much with the idea that they are to be taken as an absolute guide by business concerns in other industries, but because they are a valuable index to the business world, such a large percentage of which has transportation problems analagous to those of the New York Telephone Company, and because the character of service in which these trucks are employed is as exacting as the average user of motor trucks ever expects to subject his machines to. It will be noted in examination of these figures, given below, that a one-ton truck which represented an annual operating expense combined of $3,885.24 showed a net annual saving in comparison with horse vehicles of $2,417.76, figuring the depreciation at more than 33⅓ per cent, so severe is the character of work in which this type of truck is employed. When it is considered that 15 per cent is the usual depreciation charge made against a motor truck, it will be obvious that the economy which this truck showed under such a burden of fixed charges is remarkable.

In Statement B, the same company's experience with motor trucks, it will be observed the net annual saving for a three-ton Mack truck over horse trucks equivalent in work performed was $1,429.01. This

figure represents a dividend of 40 per cent on an investment of $3,750. Certainly no other part of a business equipment costing this amount of money can show such enormous earning capacity.

STATEMENT "A."

COMPARISON OF MOTOR VEHICLES WITH HORSE-DRAWN VEHICLES.

Detail of Operating Expense and Saving Made by Three-Ton Trucks used by Cable Placing Department.

Annual Operating Expense Three-Ton Mack Truck, Based on Performance of Ten Trucks, Average 10,900 Miles.

Chauffeur's salary (full time including overtime)	$1,146.50
Garage and washing	240.00
Gasoline (.0365 per mile)	397.85
Lubricants (.0171 per mile)	186.39
Tires (.055 per mile)	599.50
Supplies (miscellaneous)	54.50
Repairs	240.00
Depreciation, interest and taxes	1,020.50
Total	$3,885.24

Approximate Gross Annual Saving on Horse-Drawn Vehicles Replaced by Three-Ton Mack Truck Based on Seven Month's Usage.

Truck hire (August to February)	$2,904.20
Carfare (August to February)	361.69
Freight (August to February)	118.00
Total, seven months	$3,383.89
Approximated annual saving	$5,800.00
Approximated annual saving on placing cable	500.00
Total	$6,300.00
Approximated gross annual saving by 3-ton Mack truck	$6,300.00
Annual operating expense of 3-ton Mack truck	3,885.24
Net annual saving per truck	$2,414.76

STATEMENT "B."

COMPARISON OF MOTOR VEHICLES WITH HORSE-DRAWN VEHICLES.

Detail of Operating Expense and Saving Made by Three-Ton Trucks Used by the Heavy Aerial Construction Gangs.

Annual Operating Expense Three-Ton Mack Truck Based on Performance of Seven Trucks, Average 5,310 Miles.

*Chauffeur's salary (part time)	$ 360.00
Garage and washing	240.00
Gasoline (.0635 per mile)	331.87
Lubricants (.0325 per mile)	172.57
Tires (.055 per mile)	292.05
Supplies (miscellaneous)	54.50
Repairs	120.00
Depreciation, interest and taxes	750.00
Total	$2,320.99

Approximated Gross Annual Saving on Horse-Drawn Vehicles Replaced by Three-Ton Mack Truck.

Teams for hauling men, tools, etc.	$1,450.00
Placing cable	350.00
Extra truck for hauling poles	150.00
Extra truck for hauling cable	300.00
Traveling time of men	1,200.00
Labor setting poles	300.00
Total for year	$3,750.00
Approximated gross annual saving by 3-ton Mack truck	$3,750.00
Annual operating expense of 3-ton Mack truck	2,320.99
Net annual saving per truck	$1,429.01

As an example of the earning capacity of the motor truck over the railroad or trolley for medium and short haul service, an interesting experience of the Bell Telephone Company of Philadelphia with a 1½-ton Mack truck is very interesting to merchants who are considering the use of motor trucks for delivery service in suburban territory. This machine was used for shipping supplies from the company's storehouse at Philadelphia to towns within a radius of 25 miles from Philadelphia. It will be noted from this table that the saving by motor truck over express service was 74 3-10 per cent. These figures are only ordinary results, which are being obtained by public service companies who are contracting with merchants to deliver goods to suburban customers.

By express, 5,455 lbs., @ $0.50 per 100 lbs.	$27.28
By freight, 5,455 lbs., @ $0.50 per 100 lbs.	7.09
Hauling in Philadelphia	5.30
Hauling in Sellersville	5.00
Total cost by freight	17.39
By motor truck	7.00
Saving by motor truck over express (Or 74.3 per cent.)	20.28
Saving by motor truck over freight (Or 59.7 per cent.)	10.39

A most interesting example of the money saving feature of the motor truck is found in the experience of the American Car and Foundry Company, Chicago. The American Car and Foundry Company, as is obvious, has transportation that belongs to the heavy duty long haul class; service such as would be expected is the kind that enables a motor truck to show particularly its tremendous economy over horse equipment. This large corporation in a year's operation of a 6½-ton Saurer truck on an exact cost accounting basis shows that its truck transported 14 1/10 tons per day a distance of 33 miles at an average cost of 6.45 cents per day, or a per ton cost of 45.8 cents. Adding to this per ton cost interest on the investment at 6 per cent and all necessary motor vehicle insurance and an annual overhauling fund of $450, which fixed charges increase the per ton cost by 32.2 cents, the total cost per ton transported was 78 cents. With rented horse equipment the former cost was $2.00 to $2.50 per ton. In other words, the Saurer truck is saving the American Car and Foundry Company about $400 per month, which represents a return on the investment of 98 per cent, or is sufficient to pay for the truck in one year's service.

Specific data on the economy of motor trucks could be quoted at great length, but space does not permit, and the multiplication of these examples would only serve to add greater emphasis to the general proven fact that a motor truck intelligently installed, intelligently handled and cared for and operated in a manner described by its manufacturers, never fails to show either a large direct saving in dollars and cents or, by keeping transportation costs at a standstill, trebling or quadrupling in many instances the zone of business in which its owner can efficiently operate.

*The chauffeurs operating these trucks are experienced linemen and work with the gang when trucks are standing idle; hence part of their expense is properly chargeable to the work.

Badge and Picture Identify Telephone Inspectors

A new badge has been given by the Cuyahoga Telephone Company to its employees in the war upon the fake inspector, who has been visiting Cleveland homes, and the fake telephone collector who has robbed pay stations.

The badge cannot be used alone and housewives are requested to insist upon presentation of the new buff colored identification card which gives the employee's name, age, weight, color of hair, color of eyes and color of complexion and which is signed by C. Y. McVey, general manager of the company, and by the employee.

The badges and identification cards are numbered the same, and a list of the numbers, with the employees' names, has been filed with the city clerk.

Recent Telephone Patents

By David S. Hulfish

U. S. PATENT No. 1,041,030. Improved Coin Collector for Telephones. Issued to E. B. Craft and A. F. Dixon, Chicago, Ill., assignors to Western Electric Company, of same place. Application filed 1907.

The principal feature of novelty in this coin collector is that it is a "money back" machine for handling toll-line or long-distance calls where several coins must be deposited in advance of the conversation.

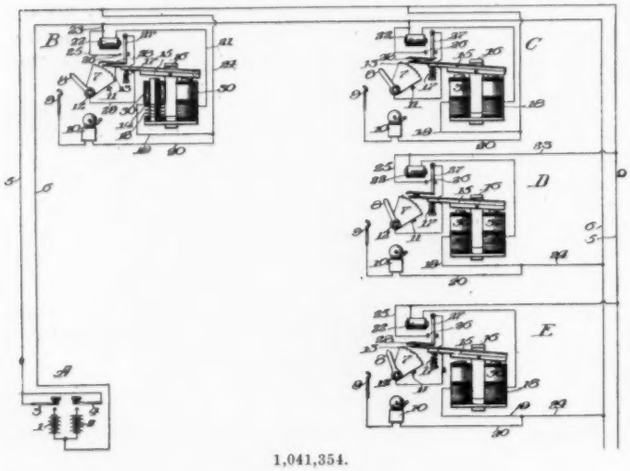
The coin collector is provided a path for coins dropped through a slot, a lever projecting into the path so that it will be struck by the coins, and signaling apparatus associated with the lever to announce over the telephone line to the central office operator the number of coins which have been put into the machine.

The coins when thus dropped through the slot by the telephone user pass into a receiving cup, which is under the control of the armature of a polarized electromagnet, which in turn is under the control of the central office operator. If the call terminates successfully the operator causes the polarized electromagnet to tip the coins in the cup toward the telephone company's cash box in the collector, but if the money has not been earned, then the central office operator causes the magnet to move its armature in the reverse direction and all of the coins in the cup are thrown into an outside open cash pocket, whence they may be taken by the telephone user.

Patent No. 1,041,354. Selective Signaling System. Issued to H. O. Rugh and C. S. Rhoads, Jr., Sandwich, Ill., assignors to Sandwich Electric Company, of same place. Application filed 1910.

The telephone stations are provided each with a stepping device, by which the station may be "selected" from the central office, and also with a polarized releasing magnet for restoring the stepping device to its position of rest or idleness.

The stations of the line are divided into two sets, the re-



1,041,354.

lease magnets of one set operating with one character of current, and the release magnets of the other set operating with a different character of current.

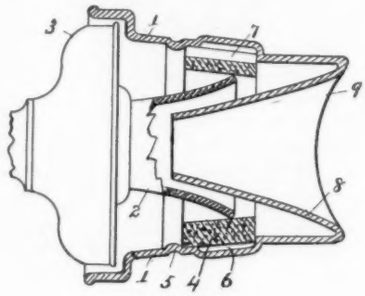
Patent No. 1,041,536. Telephone Call Recorder. Issued to Harold L. Warwick, Fort Worth, Texas. Application filed 1912.

The following is taken from the preliminary description in Mr. Warwick's patent:

My invention relates to telephone recording devices, and the object is to provide simple devices to be located at any subscriber's telephone and which can be operated from the central office and which operates automatically when the connection is made at the central office.

The advantages are that when the line is busy, the operator at the telephone exchange can record the number of the party calling in the office of the party who is talking so that the party can see who has called while he was talking. In this manner a person will not have to call repeatedly and be told that "the line is busy." He can call and if the line is busy, he can wait and attend to other business and know that he will be called as soon as the party leaves the line. This will save time of the person who wants to call and save time of "central." If a person calls and "central" answers,—"No one answers," "central" or some other operator can record the call at the telephone where no one answered. When a subscriber returns to his office, he can see who has called while he was out. Central, or the operator who attends to the recording mechanism, can record a number at the subscriber's telephone without in any manner disturbing the conversation which the subscriber may be carrying on over the telephone. The addition can be made to established telephone systems.

Patent No. 1,041,545. Muffler Mouthpiece for Telephone Transmitters. Issued to Samuel S. Williamson, Philadelphia, Pa. Application filed 1912.



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The object is to provide a large mouthpiece or sound funnel, which may be attached to a transmitter by placing it over the entire front of the transmitter. The mouthpiece acts not only as a concentrator of sound waves upon the transmitter diaphragm, but also as a muffler, that the speaker's words may not be intelligible to person in the same room.

Patent No. 1,041,943. Improved Ringer. Issued to C. R. Albertus, Chicago, Ill., assignor to American Electric Company, of same place. Application filed 1908.

A telephone bell having screw mountings for its gongs for moving the gongs toward and from the tapper.

Patent No. 1,041,965. Improved Party Line Signaling System. Issued to H. P. Clausen, Chicago, Ill., assignor to American Electric Company, of same place. Application filed 1907.

The improved signaling has to do with signaling from the stations to the central office, not from central office to the stations, and it is of the "silent signal" type, whereby any station may ring any other station without ringing the central office, or any station may ring the central office without ringing any station bells.

The system of this patent also is suitable for "grounded lines" having but a single line wire.

The magneto generator at each telephone normally gives an alternating current when the handle is turned, but when a button is pushed and the handle turned the magneto generator gives a direct current.

The telephone bells of the stations ring in response to the alternating current, but do not ring in response to the direct current. At the central office the line terminates upon a polarized relay with jack and drop, the relay being adjusted to operate the drop in response to the direct current, but not in response to the alternating current.

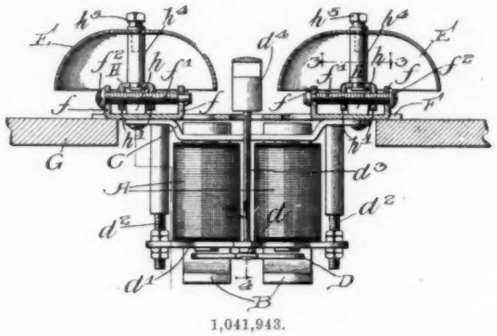
Patent No. 1,042,188. Improved Telephone Lock. Issued to Charles H. Bard, Mt. Vernon, N. Y. Application filed 1911.

This novelty lock consists of a band for surrounding the column of a portable table set, just above the hook lever, and a padlock for locking the band in place. When the band is locked in place the hook lever cannot rise and the telephone cannot be used.

Patent No. 1,042,389. Improved C. B. Switchboard Circuit. Issued to C. C. Bradbury, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company, of same place. Application filed 1907.

In connection with a two-conductor multiple and a two-conductor cord pair circuit, the answering jack has an added spring and the answering cord an added conductor and relay, whereby the battery is connected to the feed relays when the answering plug is inserted and whereby the supervisory lamps are darkened when the answering plug is withdrawn.

Patent No. 1,042,482. For Improved Selective System.



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Issued to Harry O. Rugh, Sandwich, Ill., assignor to Sandwich Electric Company, of same place. Application filed 1909.

Each telephone of a party line has a stepping selector device and at the central office are provided signal sending devices for operating the steppers at the telephones. The novel feature in this patent is the provision of means whereby a telephone user at a telephone station can start and stop the central office signal sender.

Patent No. 1,042,700. Improved Police Signal Box. Issued to A. D. T. Libby, Elyria, Ohio, assignor to Dean Electric Company, of same place. Application filed 1909.

The patent covers details of door construction for a police signal box for street service.

The novel feature of this street signal box as a whole is the provision of an electric lamp within the box, and of windows in the sides and front of the box, with lenses for projecting beams of light along and across the street as calling signals for patrolmen. Mechanism is provided for operating the lamp from the central office when it is desired to call a policeman to the telephone.

Patent No. 1,042,790. Telephone Meter. Issued to Ralph B. Head, Denver, Colo. Application filed 1911.

The meter is installed at the telephone. The telephone user pushes a button, which sets the meter's actuating spring, but does not operate the dials. When a successful conversation is accomplished the operator, by current from the central office, charges the magnet of the meter and permits the actuating spring of the meter to operate the dials of the meter to record the additional call.

Patent No. 1,042,811. Attachment for Telephone. Issued to W. D. Miller, Butler, Pa. Application filed 1912.

A device for holding the telephone receiver while in use, and suitable for attachment to a wall telephone set.

Patent No. 1,042,933. Attachment for Telephones. Issued to D. W. Leppert, New York, N. Y. Application filed 1911.

A holder for writing paper is arranged to attach to a portable table telephone and holds a roll of writing paper.

Patent No. 1,042,954. For Improved Selective Ringing Key. Issued to Charles H. North, Cleveland, Ohio, assignor to The North Electric Company, of same place. Application filed 1907.

The key is of the type which has several buttons, one for each station of a party line, and in which the station to be rung is represented and determined by the particular key depressed.

In this improved key, each of the buttons has only two springs for selecting the current to be supplied to the line, and the current then actually is supplied to the line by a master key which is operated by a rotatable shaft, which in turn, is rotated through the necessary angle by any one of the selecting buttons.

Patent No. 1,043,219. For Coin Collector. Issued to O. F. Forsberg, Yonkers, N. Y., assignor to Western Electric Company, of same place. Application filed 1911.

In this improved coin collector the coin signals are given by the "Gray" method, in which each coin strikes upon sounding gongs as it falls.

The improvement comprises a trap door in the path of the coins for holding a coin in suspense, and means for operating the trap door either to return the coin to the telephone user or to pass the coin into the telephone company's cash box.

Patents No. 1,043,299, No. 1,043,300 and No. 1,043,301. Switchboard Circuits. Issued to H. P. Clausen, assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Applications filed 1901 to 1904.

This group of patents pertain to circuit arrangements for common battery cord pair and line-lamp circuits. An illustrative claim from each of the three patents is given below:

The combination with a telephone line and line relay, of a source of current with which the line is connected, an operator's cord circuit, and means for shunting the line relay to render it inoperative when the cord circuit is connected with the line, said means comprising four switch contacts to close the shunt.

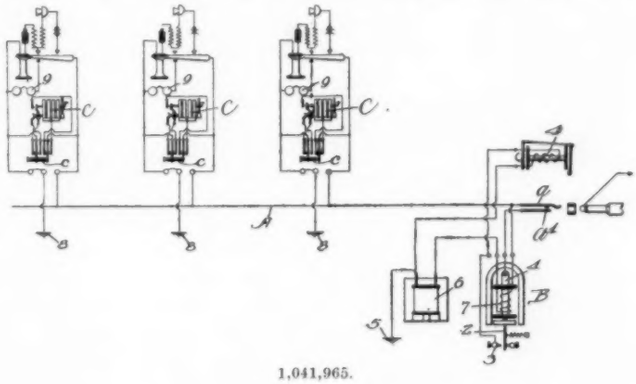
In a telephone system, the combination of a subscriber's line, substation apparatus involving a subscriber's hook switch for opening and closing the line circuit, a battery at the central station connected and arranged for supplying current to the line for both signaling and talking purposes, a line relay and impedance coil connected in series and serving as medium of connection between one side of the line and one pole of said battery, another impedance coil serving as medium of connection between the other side of the line and the other pole of the battery and a line lamp signal having a local circuit provided with a normally open switch-point controlled by said relay, said local circuit including said battery and one of said impedance coils.

In a telephone system, the combination of a subscriber's line, a supervisory or clearing-out signal at the exchange connected and arranged to be displayed until the subscriber answers a call, means for projecting ringing current on the line, so as to call the said subscriber, an electromagnet in the circuit of the said clearing-out or supervisory signal, a ringing key arranged to be attracted by said magnet and held in position to cause a projection of ringing current on to the line, a supervisory relay controlling the circuit of said supervisory or clearing-out signal, and means at the subscriber's station for causing said relay to open the circuit of the supervisory signal and thereby automatically discontinue the ringing current.

Patent No. 1,043,306. Telephone Trunking System. Issued to Alfred H. Dyson, assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Application filed 1903.

The second claim of this patent is very fully descriptive, and is quoted complete:

The combination with a trunk line of a cord circuit adapted to be connected with one end thereof, and a telephone line with which the other end may be connected, a high resistance signal controlling relay in a



1,041,965.

bridge of the limbs of the line at the latter end, a signaling device for the cord circuit through which current is supplied sufficient for the operation of the high resistance relay, the resistance of the circuit being too great for the actuation of the signaling device, and a low resistance relay adapted to be substituted for the high resistance relay, whereby the signaling device is actuated and the high resistance relay is released, and supervisory circuits controlled by the low resistance relay.

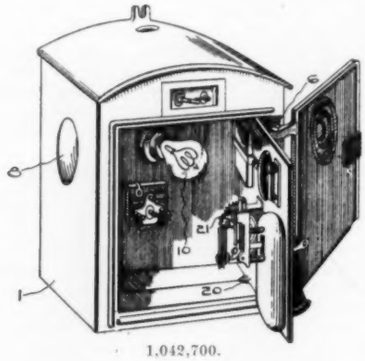
Patent No. 1,043,314. Switchboard Circuit. Issued to C. L. Goodrum, assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Application filed 1902.

The cut-off relay of the common battery line signal equipment is operated over a circuit through the tip-springs of the jack. The patent carries 69 claims.

Patent No. 1,043,526. Telephone Circuit. Issued to R. H. Lindal, Gloucester City, N. J. Application filed 1908.

The combination of a hawser connecting two vessels, tug and tow, with a telephone line wire built into the hawser.

Patent No. 1,043,783. Sound Concentrator. Issued to W. M. Lorimer, New Wilmington, Pa., and A. T. Ziegler, Pittsburgh, Pa., said Ziegler assignor to said Lorimer. Application filed 1911.



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The transmitter case has a very flaring funnel for sound, the wide mouth of the funnel being covered with an open-work plate supporting a cone inside the funnel and pointed toward the diaphragm of the transmitter.

A transmitter of this design will respond to sounds from a wider angular range than the usual telephone transmitter with its small, narrow funnel.

Meetings at Fargo and Valley City

The managers of the North Dakota Independent Telephone Company held their annual meeting at Fargo, N. D., March 13, following the annual convention of the North Dakota Telephone Association in Valley City. The managers who attended the Fargo meeting comprised F. L. Shuman of Bismarck, M. E. Hall of Dickinson, L. S. Craswell of Carrington, W. T. Craswell of Valley City, A. O. Hedberg of Casselton, H. A. Livermore of Hope, G. W. Kotts of Hope, William Burghart of Fessenden and W. Jenard of Bismarck.

The Valley City convention lasted two days and was one of the best meetings and most largely attended ever held in the history of the association. A number of prominent speakers were heard, special social features were provided for the entertainment of the delegates. About fifty managers were in attendance.

Manager W. T. Craswell of the Valley City exchange of the North Dakota Independent Telephone Company was in charge of the convention and its success was largely due to his efforts.

Mayor Platou of Valley City delivered the address of welcome and Judge Carmody of Hillsboro responded for the visitors. The speakers were H. M. Wilson of New Rockford, R. P. Baird of Fargo, Frank Bracelin of Fargo, A. J. McInnis of Dazey, F. L. Shuman of Bismarck, M. G. Stokesbury of Grand Forks, and L. D. Richardson of Fargo.

Among those heard at the second day's sessions were Paul Bunce of Fargo, Miss Eva McCready of Minot, Miss Harriet Fleming of Bismarck, C. H. Coar of Minot and J. P. Smith of Beach. All the delegates were guests of the Valley City Commercial Club at luncheon. Officers were elected in the late afternoon and last evening a special concert was provided for the entertainment of the visitors at the Normal School auditorium by some prominent Chicago artists, including Marion Greene, Dorethea North and Signor Scionti. The officers chosen for the association for the ensuing year were:

President, C. H. Coar, Minot; vice-president, L. D. Richardson, Fargo; secretary-treasurer, R. P. Baird, Fargo.

B. E. Sunny Host to Officials

B. E. Sunny, president of the Chicago Telephone Company, gave an informal luncheon early in March at the Union League Club to Union N. Bethell, senior vice-president of the American Telephone and Telegraph Company, and H. B. Thayer, president of the Western Electric Company.

Those invited to meet the guests of honor were: Byron L. Smith, president Northern Trust Company; L. G. Richardson, Alonzo Burt, H. F. Hill, B. S. Garvey, W. R. Abbott, Clifford Arrick, Verne Ray, E. H. Bangs, W. P. Sidley, F. A. de Peyster, Frank Redmund, W. R. McGovern, H. N. Foster, Sherwood J. Larned, W. I. Mizner, H. H. Henry, A. R. Bone and B. R. Cooper, all of the Chicago Telephone Company; H. A. Halligan, secretary of the Western Electric Company; Charles G. Du Bois, comptroller of the American Telephone and Telegraph Company; Mrs. Dewhurst, Mrs. Hyatt, Mrs. Moore, Miss Casey and Miss Cora Kohlsaat.

Mr. Thayer gave some interesting details of the telephone business and the character of the service in London and of the long distance service to points in the British metropolis. The comparison of London telephone service with that of Chicago and other American cities was greatly to the advantage of the latter.

All Elevators Have Telephones

Use of the telephone is constantly becoming more extended. A recent installation of considerable interest was that made by the Western Electric Company in the Woolworth Building, New York. That structure is fifty-five stories high, and its fifteen elevators are each equipped with a telephone set and a loud talking receiver. These are connected with a main switchboard, operated by the elevator starter, on which the position of every elevator is constantly shown. The starter can switch his telephone in on any floor and get any one of his men to stop or start at any time. There is also a connection with the engine room by which the starter, in case of accident to engines or to elevators, can immediately be notified.

Operators Given Time for House-Work

Telephone operators in Copenhagen, Denmark, work on an average six hours per day, rates of wages being regulated accordingly. This regulation is based on the usual European custom of providing a certain time which the girl operator can spend at home in the discharge of the domestic duties which devolve upon her. The operators all wear uniforms of a specially chosen, non-dust-collecting cloth, and the gradations of rank are indicated by variations in the braid trimmings of the uniforms.

European Telephone Development

By Fred W. Scholz

THE ROTTERDAM TELEPHONE EXCHANGE.

ROTTERDAM has about 18,000 subscribers, whose service is handled by one exchange, using common battery with distributer system. The subscribers' lines enter the exchange building through air-insulated lead cables, each having 112 double strands. Through a cable chute the cables reach the main distributing room, where each cable is connected to two unarmored 56 strand lead cables, which latter lead to the main distributing frame. Below the corresponding distributing frames, these 56-strand cables are again divided into two 28-strand silk-jute cables, which are provided with the usual safety fuses, cut-outs, etc. The fuses can stand a maximum load of 3 amperes. In this distributing room there is in addition the small power plant, furnishing the necessary current. There are sets of generators, each having 350 ampere capacity, and two call current generators. The motor generators receive their current from the municipal central station. One of the ringing generators is fed from the central station, while the other is connected to the storage battery of the exchange. The entire set of storage batteries is divided into two units, each of which is capable of supplying 2,000 ampere hours. The two sets alternate in feeding the exchange apparatus, each of them taking over this duty for ten hours. While one of the batteries is discharging the other is being charged.

The multiple switchboard is divided into two divisions, namely, the eight distributer positions with the call signals of the subscribers, and the multiple panels for the operators making the connections. The so-called distributing system is used for answering calls; its principles were worked out by J. A. Avén of Stockholm. The distributing system differs from the usual systems in that the receiving and answering of a call are not performed by the same operator, but are handled by two separate persons. An A-operator at the distributing board receives the call, and transfers it to a B-operator who is not busy and makes the required connection. Asking the number from the calling subscriber, calling up the second subscriber and making connections is done by this latter operator. In actual operation the call lamps are removed from the multiple boards and are placed in special distributing boards. In the Rotterdam exchange each distributing board has two operators, each having about 600 call jacks, making a total of 1200 subscribers for each board. Every multiple switchboard has three operators and contains the connecting jacks of all subscribers. Every connection operator's switchboard is connected with each of the eight distributors' switchboards by means of three-strand cords. To each set of cords belongs a trio of red, green and white lamps. The glowing of the white lamp shows each B-operator who is not busy answering calls. If on any A-operator's place a plug of this free operator is put in the jack, then all of the white lamps of this B-operator will go out at all of the distributing boards. In case an A-operator makes a mistake and tries to connect with a B-operator who is already busy, the red lamp glows and warns the A-operator against using a cord of the B-operator in question. The green lamp at the A-operator's place serves to notify that operator that the B-operator has used her calling key and has answered the call, and will be free for a new call in a short time. If all of the white lamps should have gone out, the A-operator can use the cord of a B-operator whose lamp shows green. The fundamentals of the wiring diagram for this type of telephone operation are shown in Fig. 1. If a subscriber removes his receiver, current flows from the battery through the two coils of the line relay and through the line. The relay attracts its armature; thereby a current is passed through the call lamp, and this will glow. The A-operator takes a plug of a B-operator whose lamp shows white, and places it into the operator's jack of the calling subscriber. This forms a circuit over the supervisory lamp, the key, the 100 ohm meter, the 500 ohm cut-off relay and ground. The current through the call lamp is interrupted and the latter goes out. At the same time direct connection is made between battery, meter, and key, preventing the glowing of the supervisory lamp through the grounding of the cut-off relay.

When using the plug at the A-operator's switch-

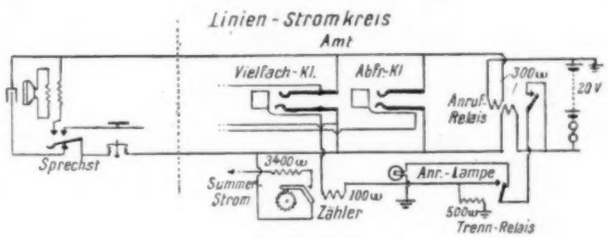


Fig. 1. Wiring Diagram of Rotterdam Exchange.

board, relay *A* receives current as follows, shown in Fig. 2: Battery, cord contact, armature of non-excited relay *D*, winding of *A*, armature of relay *K*, battery. When the armature is attracted to relay *A*, relay *B* is also excited by circuit to ground, winding of *B*, lower contact of armature of relay *A*, and battery. The white lamps of the corresponding B-operator become currentless, and go out at all A-operators' places.

If the A-operator has placed the plug into a subscriber's line jack, then relay *C* receives current from the battery, subscriber's line, plug sleeve, spring *1* of the calling key, winding of relay *C*, armature of relay *J*, armature of relay *F*, armature of relay *H*, ground, relay *C* attracts its armature and closes a call circuit through a calling lamp at the place of the B-operator whose cord connects with the A-operator. The latter moves the calling key into the answering position and asks the number of the subscriber. In this position, relay *E* receives current from the battery over the outer contact of spring *8* in the calling key, cord contact *T*, ground and relay *D*, 1500 ohm coil, outer contact of spring *7* of the calling key, ground. Relay *D* attracts its armature and interrupts the current to relay *A*, whose armature interrupts current over relay *B* when falling away. If the armature falls away from *B*, all of the green lamps receive current by way of battery, lamp, lower contact

of armature of excited relay *E*, upper contact of the fallen armature of relay *B*, ground. When placing the operator's answering key into the call position, relay *C* is made currentless and releases its armature. The call lamp *S* at the B-switchboard becomes currentless and goes out. The testing of the desired line for "busy" is made in the usual way. If the line is free, the connecting jack is plugged. Relay *F* receives current by way of the jack of the called subscriber, the plug, battery. The lower armature of *F* closes a circuit by way of battery, supervisory lamp *O*, armature of the non-excited relay *G*, lower armature of *F*, ground. Lamp *O* lights up. After plugging the jack, the operator shifts the answering key into the calling position where it is held for a few seconds. The ringer sends current into the line of the desired subscriber and rings the latter's bell. The call current flows through a 35 ohm coil of relay *G*, outer contact of spring *5* of the call key, subscriber's line, outer contact of spring *6*, ground. Relay *G* attracts its armature and holds it by means of a 400 ohm winding, until the required subscriber removes his receiver. Releasing the armatures of relay *G* interrupts current to lamp *O*, which goes out. When the upper armature is released from *G*, the counter of the calling subscriber receives current from battery sleeve of calling jack, upper armature of *G*, middle armature of relay *H*, counter key *L*, relay *M*, ground. When the armature leaves *M*, the counter electromagnet is excited, and registers a call. The register supervisory lamp glows and shows the operator that the call has been properly registered on the counter. When the armature is released from relay *G*, a red lamp *N*, connected with the calling plug, receives current by way of the lower armature and the inner contacts of relay *G* and *F*. Lamp *N* lights and shows that the called subscriber has not answered the call. When the B-operator brings her speaking key back into the call position, the relay *E* becomes currentless and releases its armature, whereby all of the white lamps at the A-operators' places receive current and glow, showing that the B-operator is open for other connections. With the answering key in this position, relay *H* is excited by current from line relay of the subscriber, springs *5* and *3* of the speaking key, inner contact of the armature of relay *G*, relay *H*, cord contact *V*, and ground *H* attracts its armature and releases the counter system, so that in case the subscriber does not answer, a second ring can be given, without counting a second call. When the subscriber answers, relay *F* becomes currentless. When the armature is released from relay *F*, the circuit through relay *G* is interrupted and this later also releases its armature. After the connection has been made, relays *H* and *D* are the only ones which are excited in the cord circuit, and all the lamps have gone out. When the subscriber hangs up his receiver again, his line relay is currentless, the latter releases its armature, and the connection between battery and plug is interrupted.

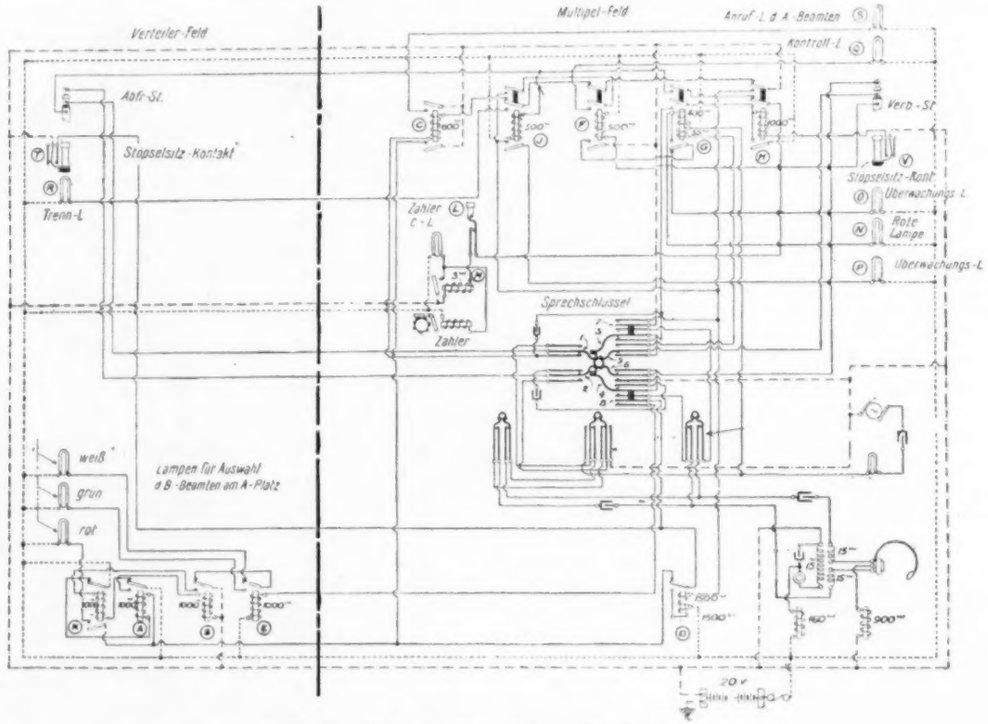


Fig. 2. Wiring Diagram of Rotterdam Exchange.

Relay *J* is excited and its armature is attracted. Lamp *P* glows, showing the end of the conversation, receiving current by lower armature of relay *J*, upper armature and inner contact of relay *H*. If the second subscriber hangs up his receiver, relay *F* is excited, attracts its armature and closes a circuit between battery, lower armature of relay *J*, lower armature of relay *F*, ground. When lamps *P* and *O* glow, the supervisory lamp *Q* also glows, receiving current by way of upper armature of relay *F*. If both clearing lamps glow, the B-operator takes the call plug out of the multiple jack. Relay *F* is currentless, releases its armature and interrupts the circuit to lamp *O* which goes out. When the plug goes back to the rest position, relay *H* becomes currentless through interruption of cord contact *V*. A

circuit from battery, cut-off lamp *R* at the A-operator's place, armature of relay *J*, armature of relay *F*, armature of relay *H*, ground is formed. Lamp *R* glows and shows the A-operator that the conversation is finished. The latter removes the plug from the jack, relay *J* becomes currentless and its armature, in falling, interrupts the circuit of lamp *R*, which goes out. When the plug goes back to the rest position, cord contact *T* and therefore the current through relay *D* is interrupted and the different parts of the system are back in their original rest position. The three keys shown in Fig. 2 enable the B-operator to speak with either of the subscribers, without the other hearing what is said. There is an additional key *L*, which is used to interrupt the counter mechanism in case that becomes necessary.

The results obtained with this system in Amsterdam are well shown by the statistics gathered since 1908 at the start of this plant. The first telephone exchange was started in 1896 with a few hundred subscribers. In that year there was one connection for every 249 citizens of Rotterdam. In 1908 this number had gone to one telephone for every 69 inhabitants, and in 1910 to 58 per capita. In 1908 the old exchange was remodeled and rebuilt to its present form. The saving accomplished with this system amounted to about 50 per cent in multiple panels, and 30 per cent in telephone operators. The different operators can be better controlled under this system, and are at the same time able to give better service with less fatigue. The disadvantages of this system lie in the facts that the operators are made to do automatic and mechanical work void of all intelligent thinking. This has led to the problem of eventually introducing the automatic system, and Rotterdam is watching some of our American trials with automatic telephony to see the practical side of this attempt.

A practice copied from American telephone service is the giving of time to any inquirers. In 1910, when this was first introduced, there were received on the average about 2,934 calls for time on work days, and 1,130 on a Sunday, amounting to almost 800,000 during the year, or 2.85 per cent of all calls received. A second side line which this exchange has is the electrical control of Rotterdam clocks. There is a network of electrical clocks connecting to more than 135 clocks in private buildings, that are regulated. The increase of efficiency of this telephone system over older systems is shown in the comparison of the average work done by an operator under both services: 1,140 calls with 1,000 connections with the new system against 897 calls with 804 connections under the old system in the same time and with less trouble to the operators. The maximum number of calls received and answered last year was 9,700 per hour, using 60 operators, namely 20 A- and 40 B-operators. Of complaints about poor service and trouble, the average last year was 74.5 per day, which when investigated showed 67.4 actual interruptions that needed repairs. The total number of complaints last year averaged 3.88 per cent, of which 3.15 per cent were found to be real.—*Elek. u. Masch.*

TELEPHONE TIME SIGNALS.

The Vienna Astronomical Observatory has just started a new telephone time signal system, which will be briefly described. Before going over this, however, a short account of the older time signal system used within the observatory itself may not be out of place.

The most important part of this equipment is the solar time clock. It contains a solar time second pendulum, and makes a contact every alternate second, which closes a circuit. This current synchronizes two solar half second clocks, by exciting an electromagnet, which attracts a soft iron armature, attached to the lower end of the pendulum rod. The most important part of the clock system is the main clock for Central European time. The works of this are kept in an air-tight glass case in order to eliminate the changing atmospheric pressure which would influence the pendulum. The clock is kept going by a device consisting of a lever which is raised every 30 seconds by means of an electromagnet. When the lever sinks, its weight drives the clock mechanism. When this lever has reached a certain position on its downward path, it closes automatically the circuit which excited the electromagnet, and the lever rises again. The main clock closes an electrical contact every alternate second and operates a relay, which closes the circuit for synchronising a number of clocks. With these contacts there is a third arrangement, which during interruption of circuit, switches a shunt into the wiring system, which prevents the formation of sparks and the consequent production of oxides on the contacts. This

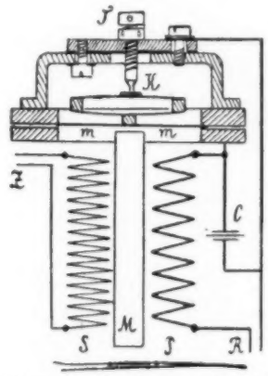


Fig. 3. Time Signal Apparatus of Observatory.

synchronizing forces the pendulums of all the clocks to keep in swing with the pendulum of the main clock. The main clock in this way first of all synchronizes the main operating clock, which latter closes a circuit every minute, alternating in one or the other direction. This change of direction prevents the continuous magnetization of the electromagnets of the secondary clocks in one certain direction and presents trouble in operation. The electromagnets operate about 20 minute clocks. The driving wheel of the main operating clock closes a circuit at 12 o'clock noon, which shoots off a cannon on the roof of the observatory. This driving wheel also operates the time signals. The wheel makes a complete revolution in ten minutes, dividing each hour into six parts of ten minutes each. The different ten-minute signals are given by a siren which sounds at intervals of two seconds. The current circuit closers of the operating wheel operate a relay, which generates a current, operating an electric siren and giving the proper signals. The intermittent current of air from this electric siren is passed into a telephone instrument. The Vienna telephone lines or outside lines are connected to this current conductor in case time signals are to be given. To give off these siren sounds the apparatus shown in Fig. 3 is used.

Wires *R* come from the relay which is operated by the main operating clock whenever a signal is to be

given. This relay closes the current of a battery, which is necessary to excite the signal siren or signal horn. The two wires Z lead to the telephone exchange. The siren has a steel disc mm, which forms the tone and is stretched between the edges of the casing. Below the same is an electromagnet M, a bundle of varnished, soft iron wires, which carries the two coils P and S. The current coming from the relay flows through the coils P of 5 ohm resistance, passes through the diaphragm and the spring attachment carried by it, to contact K, then through the set screw T to the return circuit. The electromagnet excited thereby attracts the diaphragm, releases the contact K and interrupts the circuit. The steel disc then swings back to the equilibrium position, closes contact K and with it the current, and this play is repeated 500 times a second. The steel disc is therefore made to sound, and gives sounds like those of a siren. The intermittent current excited in the process is used to give the telephone signals, although indirectly. It induces an alternating current in the coil S of 200 ohm resistance, which passes into the exchange and transfers the sounds to the connected telephone and makes it repeat the sounds of the siren. Condensor C is to prevent sparking of contact K. The observatory has a regular telephone signal service and subscribers to the telephone exchange may also subscribe to this service and have their lines connected to the observatory wires.—*Elek. u. Masch.*

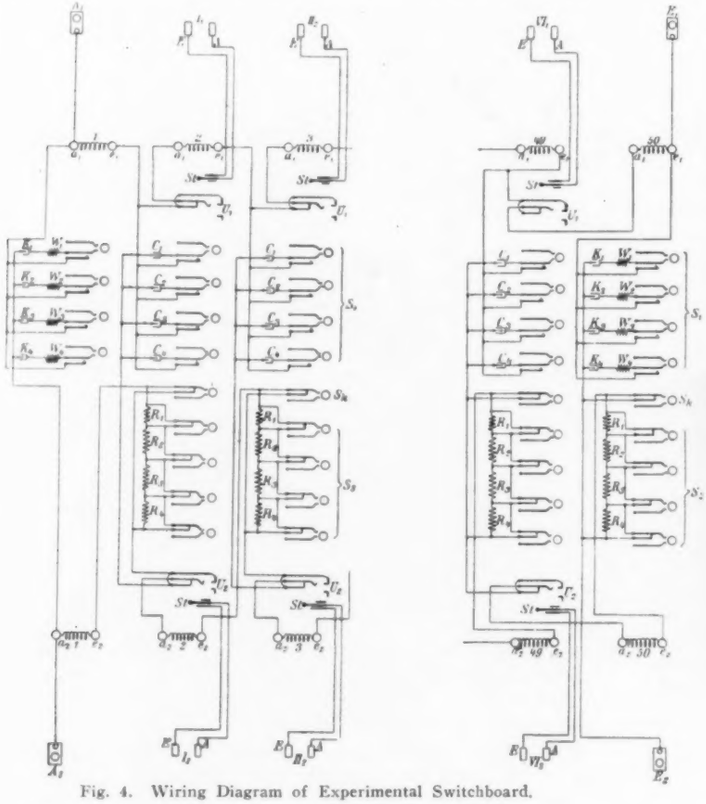


Fig. 4. Wiring Diagram of Experimental Switchboard.

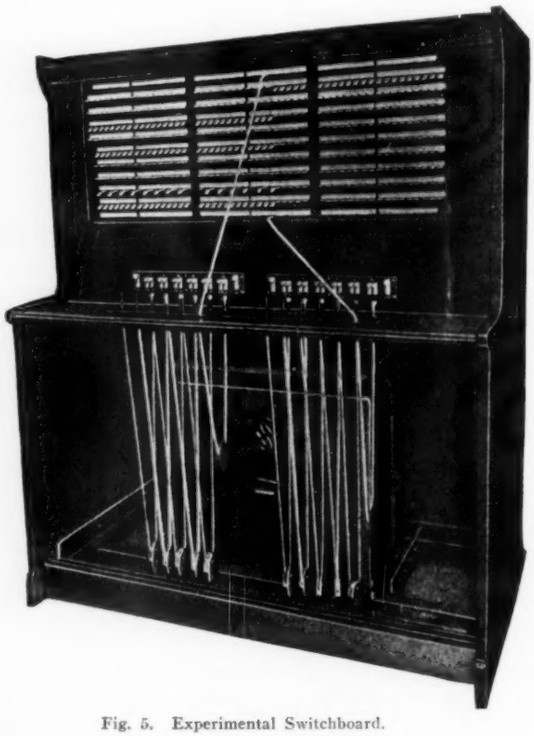


Fig. 5. Experimental Switchboard.

AN EXPERIMENTAL TELEPHONE SWITCHBOARD.

The Imperial Telegraph and Telephone Department (Germany), has worked out an experimental switchboard for testing any arrangement of telegraph or telephone circuits, which is very interesting. The idea in the start was to obtain some sort of artificial method of creating any type of natural current circuit, as for example those found in Pupin lines, overhead lines and cables. The damping effect was to be determined within wide limits by this method. The switches used to pass from one type of wiring system to another were to be so simple, that a few throws of a switch would be sufficient to bring about the change. The different elements of the experimental line were to have no inductive influence on each other. The following abstract will merely bring out the constructive features of this experimental switchboard, without trying to go into the theoretical sides of some of the tests made with it. Fig. 4 shows the wiring diagram for the switchboard.

There are $n = 50$ elements, which are placed in series. The two induction coils a_1 e_1 and a_2 e_2 of each element, one for the outgoing, the other for the return circuit, consist of the windings of a Pupin double coil, placed on the same iron core. Their self induction is equal to $l_0 = 0.195$ henry. The resistance in ohms including the connecting wires is equal to $r_0 = 5.72$ ohms. The ends of these coils a_1 and a_2 and e_1 and e_2 are each connected by a condenser $\frac{1}{2}c_0$. To save space the condenser on one element is united with the same and parallel wired condenser at the beginning of the other element to form one single unit condenser. At each of the connecting points there are four condensers, marked in the diagram C_1 to C_4, having values of 0.05, 0.5, 1.0, and 4.0 microfarads respectively. To the condensers are connected resistances w_1 to w_4. The condensers are of the usual telephone type, their dielectrics consisting of paper, saturated with paraffine. Each condenser has a switch S_1 so that any condenser can be switched into the

circuit or removed from the circuit. If all the switches in a vertical row are thrown in, then the four condensers C_1 to C_4 are in parallel. Special type switches using very little space are used on account of the great number needed, and these are connected in rows of 17 to form one switch unit that can be thrown over by a single movement if desired. Neighboring elements of the artificial line are connected, in both going and return circuits, by means of contact breaking keys, shown in the figure at U_1 and U_2. The corresponding plugs for these keys or jacks are marked by *St* and have movable cords. This cord connects the plug with a terminal E, and at the same time with a second clamp A next to E. If a plug is placed in any jack, the plug will release the jack spring and interrupt the artificial line at this point. The ends a and e of the coils, previously connected by way of the jacks, are now near the terminals E or A, and are therefore easily reached for experimental work. The line can therefore be interrupted behind any element. The twelve plugs are sufficient for this work and permit the artificial line to be divided into seven distinct units. To increase the damping effect, resistances can be added to each of the coils a_2, c_2 in the return circuit, varying from 5, 15, 45 to 120 ohms. Each of these resistances is usually short circuited by a switch S_2. Opening this switch throws the corresponding resistance into the return circuit, after the short circuiting switch S_k has been opened. This latter switch has the purpose, with short circuited resistances, to offer a second path to the current flowing in the return circuit from coil to coil, a way which does not lead over the series wired contacts of switch S_2.

The external constructional features are seen in Fig. 5 and show it to be somewhat like an ordinary switchboard. Pupin double coils are used as induction coils, and are placed in a cast iron box. There is no appreciable induction between the coils. This is not surprising, as they are closely wound coils, wound around a solid iron core, which is only slightly magnetized. The heavy case with the 50 double coils is built into a frame of heavy iron, which also carries the switchboard of polished walnut. The lower end of the switchboard has only the coils. The connection between coils and switchboard wires is over a terminal board attached to the coil case. If these connections are broken, both can be transported separately. The front of the switchboard has the contact breaking jacks, switches and terminals, mentioned before. The upper end has 49 interrupter, cut-off, or contact breaking jacks. Below these are four rows of 51 switches each for the condensers. Then follows the row with the short circuit switches S_k; then four rows each with 50 switches S_2 for the resistances, and last, the row of 49 interrupter contacts of the return circuit. All jacks and switches belonging to one element lie in a vertical line. The terminals with the wires for the artificial lines and to the cord plugs are on two hard rubber boards, the left for the outgoing, the right for the return circuit. A small table immediately in front of the switchboard carries the 12 cords and plugs.

Looking at the interior of the board, we find all condensers placed on a horizontal board above the coil box. The resistances for the first 25 elements are on a vertical shelf on the right side, the other 25 on a similar shelf on the left side of the board. As there is a very large number of wires, all of these are not carried in single strands, but a number are united to a bundle of wires. To avoid all chance of induction, only the wires of ten neighboring elements are united in one bundle. The bundles are moreover placed as far apart from each other as possible. This distance is greater in proportion as the elements of the board are further apart from each other. This is very important if the line is used with a large damping effect. Here the receiving current is equal to only a small fraction of the sending current and a slight induction of the beginning and end of the line would give rise to errors. This artificial experimental telephone and telegraph switchboard has been used with great success in making experiments with electric circuits of all types.—*Elek. Zeit.*

Company Asks Party Line Permission

In order to be in a position to carry through certain large improvements in Louisville, Ky., the officers and attorneys for the Louisville Home Telephone Company have submitted to Mayor W. O. Head a petition for the amendment of their franchise in order that they may be permitted to use party lines and thus continue effective competition with the Cumberland Company. The petition is backed by a recommendation signed by over 2,500 subscribers of the Home Company.

An officer for the Home Company summarized the situation as follows:

"The Home Company has now in operation 4,000 party lines. Almost without exception these subscribers wish to keep the party lines at the low rates offered.

"Our franchise prohibits party lines, but we believed that this prohibition only extended to the kind of party lines in use when our contract was made. The Court of Appeals decided, however, that we were mistaken, and that we must take out the party lines if the city demands it, and can use them only by permit granted by the council.

"The Home Company is anxious to accommodate the hundreds of people who want to put in the party lines, and we also wish to spend $150,000 in building an Eastern exchange."

Telephone Employees Form Society

Nineteen male employes of the Chesapeake and Potomac Telephone Company and the American Telephone and Telegraph Company organized a society in Lynchburg, the object of which is to bring about a closer relationship among themselves. Employes of the Western Union Telegraph Company have been invited to join, and any male employe of the three companies is eligible for membership.

The organization will be known as the Telephone Society, and will hold monthly meetings.

Officials of the telephone company are greatly interested in these societies among their employes and they have been instituted in all cities where there are enough men to justify it.

At the meetings one of the members will read a paper bearing on some interesting subject in connection with the telephone or telegraph, and a general discussion by all will follow the reading.

From time to time local representative business men will be invited to address the society.

Besides having speeches and discussions, other kinds of entertainments will be provided at the meetings, including musical features and suppers.

Methods of Rate Fixing*

RATE fixing is one of the newer engineering problems. It is true that rate fixing commissions have been, and are, largely composed of lawyers, but the members of all of these commissions have found it necessary to rely largely upon their engineering experts, and it appears now to be entirely probable, as well as desirable, that the engineering profession should in the future have an increasing share in handling rate fixing matters. It seems probable that for some time to come there will be a steadily increasing number of engineers either employed directly by commissions, or employed by public service corporations in connection with the work of commissions. It is therefore important that engineers should devote some attention to the problems of rate fixing.

Rate fixing is designed to accomplish three objects. First, that the people served by a public utility shall pay the lowest rate possible, consistent with efficient service and a proper return on the investment of the corporation. Second, that each class of consumers pay its proper proportion of the total revenues. Third, that there shall be no discrimination between individual consumers of any given class.

The third problem is not difficult. It is only necessary to pass laws forbidding discrimination and to see that those laws are not evaded. There is no difference of opinion as to the desirability of preventing discrimination, and there is little difference of opinion as to what constitutes discrimination.

The other two problems are difficult. Taking up the first question, it must be determined primarily what is a "proper return," and second, what constitutes "investment." We will consider to begin with the case of a successful public utility. (It is obvious that a utility that was not needed by the people served, or one that is operated at such cost that the people served cannot afford to pay a proper return on the cost, cannot be subjected to the same rules that apply to a successful utility.) The consumers served by a successful corporation can afford to pay, and should pay, annually a sum of money sufficient to cover:

(*a*) The usual rate of interest on safe investments.

(*b*) An additional sum to compensate for whatever special risk the business of the public utility may involve; and

(*c*) Such excess profits as are necessary to induce capital to engage in the business.

Item (*c*), covering profits necessary to induce capital to engage in the business, is somewhat akin to item (*b*) and in fact the two items might be combined, yet there are some real differences and it has therefore been thought proper to include the third item, covering inducement. Capital is usually induced to engage in a business by a promoter. Item (*c*) may therefore be thought of as represented in part by promotion stock, or by the earnings of promotion stock.

WHAT IS INVESTMENT.

Investment may be in money, or in services. The latter is as real as the former. The fact that services have frequently been grossly over-valued has led to a feeling that the investment of services should not be permitted. This seems wrong. The services of the promoter, for instance, may usually best be paid in stock. This amounts to saying that the services of the promoter may be capitalized. The danger is of course that stock being sometimes simply a matter of the printing press, an excessive payment is made for promotion, and the public is thereafter charged with the necessity of paying dividends upon a large amount of water. Promotion stock in fact is not water unless it be issued to a greater amount than the actual services of the promoter justify.

In appraising a public utility just put together and ready to operate, an engineer would include in the appraisal, besides figures representing the cost in place of each physical item (cost of engineering, cost of insurance, etc.), also the exact cost of putting together the corporation (cost of legal work, etc.), and besides these would include payment for the energy and initiative used on the scheme as a whole, under the head of "Cost of Promotion." All the items on the schedule added together would then be the true "Investment" when the entire plant stands ready to begin operation.

FRANCHISE VALUE.

In most rate fixing investigations the franchise itself is not permitted to be regarded as an investment on which earnings are made. This is not necessarily the case, however, as it frequently costs money to get a franchise, and the terms of the franchise frequently involve an annual expense to the company. For example, it is not uncommon for an electric lighting company as a condition of its franchise to engage to supply electricity to various public buildings free of charge, or the company may as a condition of its franchise engage to perform street lighting at an especially low rate. Where any of these elements are found the franchise represents either a real legitimate initial expenditure, or a constant annual expenditure, and in either case the franchise may reasonably be regarded as capital, in which case revenues must be earned. In the latter case the expenditures may with equal justice be charged instead as operating expenses, if for any reason this is preferred as a matter of bookkeeping.

GOING VALUE.

Assuming that we have decided what constitutes "investment" for an enterprise just completed and ready to operate; what is "investment" for "going concern"? It is rather obvious that a completely equipped utility company ready to operate, but having no customers, has a different value from the same utility a little later when we may assume that its total product is being sold at a remunerative figure. The difference in value between a company without customers and the same company under full operation may reasonably be considered as represented by the cost of putting the company into the latter condition; in other words, the cost of establishing the business. This sum is represented by early losses, or by the failure to earn proper profits, in the early years of operation.

*Abstract of paper presented to Engineers and Architects Association of Southern California.

DEPRECIATION.

There is a wide difference of opinion as to proper methods of figuring depreciation and even as to what constitutes depreciation. It will therefore be assumed that depreciation is figured on a straight line basis, using the assumed useful life of the various items making up the total investment as a basis for determining the yearly charge against each item to cover depreciation. It is also assumed that depreciation has only one value at a given moment for a given item. The items of cost of franchise, if any, and the costs of general engineering, superintendence, insurance, law, promotion, going value, etc., should be subject to a depreciation charge as well as are the items covering actual physical property. This means, of course, that such intangible costs as those just enumerated are to be written off, or amortized, in the course of time.

The bookkeeping in connection with depreciation expenditures should be wholly under the control of the commission, that it may be made certain that no part of the plant, built with depreciation money, is capitalized, even though the depreciation fund proves in the course of several years to have been larger than was really necessary. This, of course, applies to additions made under regulation and not to additions made out of surplus earnings before the advent of rate regulation.

If, after determining a proper income to be allowed, it be found for a particular corporation that its stock and bonds have enjoyed a wide market, and have been generally distributed and would be considerably depreciated by the revenue proposed to be allowed, then it seems to be logical that a commission may reasonably allow weight to such a state of facts. On the one hand a strict ruling will bring an immediate loss upon the investor, and on the other hand if the strict ruling be not followed a loss is thrown upon the general public, by collecting from them higher rates than are necessary. A newly organized commission might very reasonably compromise by fixing a term of years at the end of which strict rulings will generally apply, and in the meantime gradually lower the rates during said term. Such a course does not correct past injustice, but it divides the losses resulting from injustice between the stockholder who has made an unfortunate investment, and the public that permitted the unfortunate conditions to exist.

DETAIL OF RATES.

It seems reasonable that the revenue collected should be based ultimately upon the "present value" (reproduction cost, less straight line depreciation) of all physical and non-physical items of property necessary to the service sold. The revenues should be sufficient to cover operating expenses; depreciation charges; and income upon "present value."

It would seem at first sight that if an agreement be once reached on total revenue to be collected the rate problem would be practically solved. Such is by no means the case. It is hardly too much to say that some of the hardest problems still remain. These problems do not seem to be of such a nature that any general solution may be indicated.

The Lay of a Layman

By the T. E. Dopester

WRITING in January, this year, I set down this sentence: "None of us will be shocked when we get the next American Telephone and Telegraph Company's annual report to its shareholders to find that there are upwards of 7,500,000 stations in the Bell system." I do not quote to show the literary excellence of the statement. I lay no claim in that direction. But the report of the A. T. & T. Co. for 1912 lies before me and in the second paragraph, page 3, it says there are 7,456,074 stations in *its* system. Of these, 2,502,627 are operated by "local, co-operative and rural independent companies or associations having sub-licensee or connection contracts, so-called connecting companies." In other words, the Bell has 5,000,000 stations of its very own and because of interconnection with independent operators it raises the whole system to seven and a half millions. For the very same reason, the Buffalo Wallow Home Telephone Company is permitted to say that its system now comprises 7,456,074 stations, of which 7,456,031 are associate or sub-licensee operators.

* * *

Here's the rub. The Bell Telephone Company capitalizes the sub-licensee. Its stockholders are impressed that there is only one telephone company in the world—the Bell. Not content with confining its statements to itself—five million telephones in a system isn't anything to apologize for—it has in mind, right off the reel, those interconnected stations—half its own total. Independents will also please note that 344,173 of these instruments were connected to the Bell in 1912—nearly a thousand a day, including Sundays.

* * *

Adding 2,500,000 "rural independent companies" doubtless helps in compiling Bell statistics like this: "The Bell toll lines of the United States now reach 70,000 places, from many of which a telegraph message can be sent. The extent of the system is best realized by comparison with less than 65,000 postoffices, 60,000 railroad stations and regular telegraph offices at about 25,000 places." I recall that it was the farmer who built those rural lines into the remote places where there were no postoffices. I am glad that this same farmer is connected with a system that lets him talk to the rest of the world, if he wants to, but I never knew a farmer who cared. He was pretty well fixed when the local company took over his rural line. That the local company made a connecting arrangement with the Bell has little concern for him. You see how vital this farmer is to the A. T. & T. Co.'s annual report, though, don't you? The statistician for the Bell includes him in the third paragraph, page 3. The stockholder is profoundly impressed that the Bell system is the only telephone company in the world.

* * *

And leaving the interconnected companies right there, after they have contributed the opening thrills, the Bell confines the rest of the report to its own immense proportions. It doesn't require a figure larger

than fifteen million miles of wire to make a hit. Nobody realizes what it means any way. The lineman knows when a lead goes down and there it ends. To wind fifteen million miles of wire around the earth at the equator would mean 600 operations without tying it in. Dad Wasson would have to build a whale of a payout reel to do that job and make the cart balance.

* * *

But the Bell should have full credit for laying down genuinely dependable figures for us to play with. Seven million and a half telephones means 2,500 times 300 times 10. Counting the life of a telephone ten years, the manufacturer will have to go right along making two thousand five hundred telephones every day as a regular thing to supply the "Bell system" alone, presuming that there is no more growth; no foreign market; no fires; no floods; no evolution in design; no invention. It sounds like music for the maker, doesn't it?

* * *

The Bell's traffic statement says there were 8,472,000,000 conversations last year. If you want to add the simon-pure independent figures to that amazing sum, go as far as you like. I'm satisfied to know that we are a busy bunch of telephone subscribers and we all try to get our money's worth. That we succeed, seems to be proven by the peg count.

* * *

I am of the fixed opinion that the telephone business will always remain a thoroughly satisfactory one. That much of the work must all be done over again and again to keep pace with demands of the public, goes without argument. This phase of it means that the manufacturer will continue to flourish. There will never come a time when the equipment will settle down to standards. The railroads have never found a stopping place, nor will the telephone system. Telegraph equipment has stood still in this country because it was lodged in hands that were content to let well enough alone. Comparing telephone traffic with the two other branches of transmission of intelligence—the mail and telegraph—the A. T. & T. report for the United States gives credit as follows: Telephone, 59.5%; mail, 40.1%; telegraph, 0.4%. The telegraph was used for 108,000,000 messages—the telephone for 14,400,000,000! That is proof enough that the telegraph is tied to a post. But before you forget, I wish to direct your attention again to the 8,472,000,000 Bell telephone conversations which includes long distance calls, but eliminates the interconnected or sub-licensee exchange records. Take these latter and add the simon-pure independent system and you will discover that the independent telephone is credited, unwittingly perhaps, with something like 6,000,000,000 conversations in its own right. Which would indicate that some of those independent manufacturers of apparatus have been entirely too busy with their razor stroppers and vacuum cleaners and things.

* * *

I have talked with a number of independent telephone manufacturers who have been directing their energies along other lines and in each instance they confess that the telephone business has been the predominating factor. With this condition existing, I am confident that with their old-time vigor applied, the business would not have slumped. I know of no better example to offer than the Kellogg company. If you want to see a busy independent telephone factory, you should visit in the vicinity of Congress and Green streets. Just in passing, I am told that Kellogg will move into the old W. E. quarters on Clinton street. I wonder if the bunch over there will stand for Mahogany Lane? At any rate, the Kellogg was never so busy in its history as it is today, which is ample proof that it pays to stick it out.

* * *

Mr. Vail bears me out in my contentions when he briefly refers to his manufacturing auxiliary—the Western Electric Company. Hear him: "Sales to other customers have increased." Short as it is, it tells us that the sub-licensee arrangement has given W. E. salesmen a chance to get in and they have been delivering the goods. The place to increase Western Electric's sales has been "to other customers," and no opportunity escapes. The independent maker believes in competition in the telephone business and it should be a part of his scheme to cover the field in a vigorous selling campaign. Whereas, he formerly depended upon sentiment and apparatus, he no longer finds sentiment playing into his hands. Quality apparatus finds ready sale among telephone operators, but it costs both time and money to maintain a quality reputation. The manufacturer who hewed to the line of quality finds no trouble nowadays to market his product. The maker who busied himself with side lines during the temporary breathing spell of independent operators is confronted with problems that are not easy of solution. Price alone has little inducement. Only a short time ago the announcement was made in these pages over the signature of an independent manufacturer that common battery telephones might be had at $3.50 each. No doubt they were good value at a higher figure, but I am sure TELEPHONE ENGINEER subscribers are not investing in such equipment, because it was hold-over stuff—the kind that had not kept pace with development.

* * *

The immensity of the telephone industry should appeal more strongly to those factories which are still identified with it in a half-hearted way. I look for a new regime, evolutionary in many respects. I know of considerable activity in this direction. I know that certain practices already exist, at places where operating conditions are in the throes of hot, competitive strife, which should be employed where there is no stress of competition. Any plan which improves the service and contemplates a less outlay for apparatus should be adopted universally. The telephone requires such improvement. Because finance decrees, under present standards, that the station itself shall represent an approximate unit for capital account, should not be excuse to continue with obsolete operating practice. If methods have been devised to improve the traffic capacity with present equipment, it is manifestly unfair to hold it as a weapon to be used only where competition forces it.

Canadian Bell Issues More Bonds

The Bell Telephone Company proposes issuing additional bonds and debentures to the amount of $3,750,000. The outstanding bonds of the company at present amount to $6,399,000 and the paid-up capital to $15,000,000. The company has authority to issue bonds up to 75 per cent of the paid-up capital. The company will add two and a half stories to the present head office on Hospital street, Montreal, making eight and a half stories in all. The work is estimated to cost $52,000. The addition will be constructed of brick, and the floors of maple. The roof is to be felt and gravel.

High Frequency Waves on Wires

By John S. Stone*

FOR the past three years or more Major Geo. O. Squier, of the signal corps of the United States Army, has conducted a systematic investigation of the propagation of high-frequency electric waves along wires and of the practicability of their use in the transmission of signals and of speech along actual telephone cables and air lines. His investigations have also dealt with electrical resonance as a means of segregating, at the receiving end of the line, high-frequency currents of different frequencies simultaneously propagated along the line, and the selective reception of the energies of these different currents, each in a different receiver made responsive only to the variations in the amplitude or strength of the current it is resonantly tuned to receive. The results of his labors are to demonstrate that not only Morse signals but speech may be transmitted over the ordinary telephone cable and pole-line circuits and to very considerable distances by means of high-frequency electric currents or waves, and that a large number of telegraphic or telephonic messages may thus be transmitted simultaneously over a given telephone or telegraph circuit without interfering with each other through the use of electrically tuned or electrically resonant receivers. Moreover, he has shown that the new high-frequency multiplex telegraph and telephone system may be superimposed on the older systems or the new high-frequency apparatus added to lines equipped with the usual telegraph or telephone apparatus without interfering in any way with the operation of this older apparatus or being interfered with by it.

Major Squier has dedicated to the public his patents relating to this new art.

The frequencies of the electric waves or currents propagated along the wires in this new art, namely, 20,000 or more alternations per second, are ultra-sound frequencies, and the voice is transmitted over the line wire

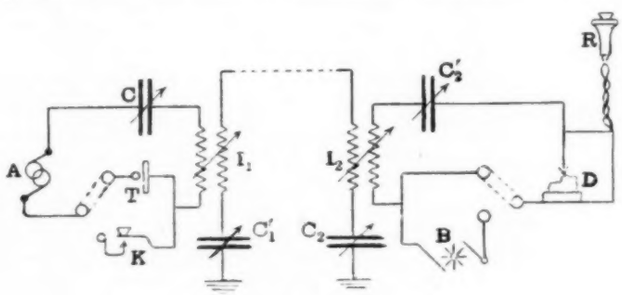


FIG. 1.

by suitable variations in the amplitude or strength of the otherwise uniform high-frequency current, the signals being received in a magneto telephone receiver connected in a local circuit which includes a device capable of rectifying the high-frequency current used. The rectifier employed is preferably an audion, though a Wollaston electrode and, perhaps, other radio-telegraphic detectors, particularly the so-called crystal rectifiers, may also prove serviceable.

The rectifier in the local circuit at the receiver converts the high-frequency current of the line wire into a pulsating current of double the frequency, or, what is the same thing, it converts the high-frequency current into a normally uniform unidirectional current with a superimposed alternating current of double the frequency

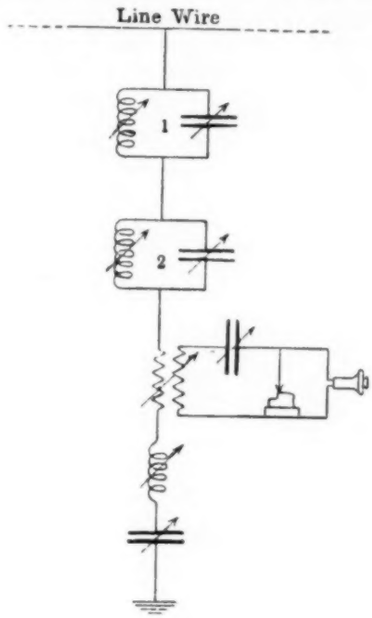


FIG. 2.

of the line current. The telephone receiver is mute to the alternating component of the rectified current, but responds to the most minute variations in the strength of the unidirectional component of this current. Variations in the amplitude or strength of the high-frequency line current are faithfully reproduced in the strength of the unidirectional component of the local receiver current, and in this way the telephone receiver is made highly sensitive to variations in the strength of the high-frequency line currents, while absolutely mute to that current when its amplitude is constant. For the realization of the great economies this art seems destined to effect in the cost of telegraph and telephone circuits, much will have to be done in the way of adapting the new system to complex telephonic exchanges, their mechanisms and networks of circuits.

The relation of the new high-frequency telegraph and telephone to radio-telegraphy and radio-telephony is to be readily seen in Fig. 1, which illustrates the new system in its simplest practical form. The diagram shows, in fact, two radio-telegraph or radio-telephone stations with a connecting wire between them to guide the waves from the transmitter to the receiver. In this arrangement the current is supplied by a high-frequency alternating-current dynamo, *A*, which must be capable of supplying 20 watts at 10 volts and at not less than 20,000 cycles per second. These requirements are met in the Alexanderson high-frequency dynamo, which, however, in the case of high-frequency telephony, has to

*Abstract of an article in the *Journal of the Franklin Institute.*

meet a further requirement not demanded of it by high-frequency telegraphy, namely, that the amplitude of the current the dynamo supplies must be absolutely smooth and have no variations or ripples on it of periods corresponding to the periods of audible tones. In this connection the author noted that a 2 kw. Alexanderson dynamo gave a loud musical tone in the telephone at the receiving end of the line when the dynamo was worked with the normal separation between the stator and rotor, and he found it necessary to increase the air-gap to a point at which the capacity of the dynamo was about one-eighth of its normal rated capacity before a quiet line was secured. Even at this adjustment, however, the dynamo had more than 10 times the required capacity.

It is not likely, however, that high-frequency dynamos will long be used in connection with high-frequency telephony, because oscillators giving sustained oscillations or continuous trains of waves of ultra-sound frequencies, constructed on the general principle of the Elihu Thomson oscillator, are very much cheaper and

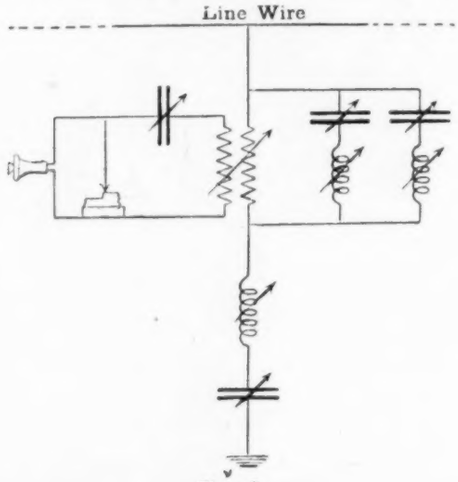


FIG. 3.

less cumbersome, while requiring less care and skill in their operation.

In the arrangement illustrated in Fig. 1, when the switches at the transmitter and at the receiver are both thrown up as shown, the arrangement is a high-frequency telephone system, while when the switches are both thrown to their lower contact points the arrangement becomes a high-frequency telegraph system, so that the one diagram may be used to sketch the operation and requirements of both the new telegraph and the new telephone.

In the new telephone system, when the transmitter T is spoken to, it modifies the amplitude of the high-frequency current in the primary circuit of the induction coil I_1 in exactly the same way that it modifies the strength of the battery current in the primary circuit of the induction coil in the old telephone system, and the telephone receiver R at the receiving station responds, owing to the fact that exactly corresponding fluctuations result in the unidirectional component of the rectified current in the local circuit at that station.

In the new telegraph system the operation of the telegraph key K, to send Morse signals, alternately throws the high-frequency current on the line and cuts off the supply of this current from the line. The result of this would be only to make successive faint clicks in the telephone receiver R as the current is thrown on and off, except for the periodic interrupter B, which may be of the nature of a revolving commutator or a mere buzzer. This interrupter serves to break the incoming wave trains constituting the Morse signal elements up into a succession of much shorter wave trains having a frequency of about 450 impulses per second, which, when rectified, give rise in the telephone receiver to a high-pitched musical tone of great audibility. The Morse signals now are audible as a succession of long and short intervals of a high-pitched musical sound, as in radio-telegraphy. Fig. 1 should, therefore, indicate clearly the essential differences between the new telegraphy and the new telephony.

Some of the more essential characteristics of the simple system shown in Fig. 1 may prove of interest, particularly as they have not as yet, so far as I am aware, been clearly set forth. The induction coils I_1 and I_2 are wound without any iron in their cores. The arrow through the symbols for the coils indicates that these coils are adjusted with respect to their degree of coupling, and the arrows through the symbols for the condensers indicate that these condensers are of adjustable capacity.

The function of the variable condensers at the transmitting and receiving stations is to "tune" these stations electrically. There is a radical difference in the tuning of the transmitter station in the telephone and telegraph systems, due to the fact that in the telegraph it is the actual amplitude of the high-frequency waves propagated along the line that determines the strength or loudness of the signals heard in the receiver, while in the telephone system it is the magnitude of the variations in amplitude of the high-frequency waves propagated along the line that determines the loudness of the received speech.

At the receiving station of the system shown in Fig. 1, whether it be used as a telegraph or a telephone system, the tuning of both primary and secondary is directed merely to the production of a maximum current in the secondary circuit; and for this tuning the telephone receiver is used as the indicating device, since the current at the receiving station is not sufficient to permit of the use of a hot-wire ammeter. A sensitive galvanometer may sometimes be used with advantage for tuning purposes in place of the telephone receiver.

The system shown in Fig. 1 is obviously not of much general utility, since it provides only for one-way transmission. A multiplex station is shown in Fig. 2.

The author discusses the duplex system as a very simple form of the new system, serving to illustrate the general characteristics of a high-frequency multiplex system. It lacks, however, a feature, the absence of which makes it necessary to choose remotely different frequencies for the use of adjacent transmitters and receivers. The author has devised means which have overcome this difficulty, and three characteristic examples of those means are illustrated in Figs. 2, 3 and 4.

In Fig. 2 the receiver circuit is shown alone, and it is to be noted that in the branch from the line wire there are two loop circuits, 1 and 2, each consisting simply of a condenser and a coil. These loop circuits are each made resonant *per se* to one of two frequencies, currents of which frequencies it is particularly desired to exclude from the receiver. The effect of the presence of one of these looped resonant circuits in the receiver branch is practically to make the branch electrically opaque to currents of the frequency to which the loop

is made resonant. So great may the impedance of such a loop circuit be made to high-frequency currents of that particular frequency to which it is attuned that it is possible to operate a system in which the receivers are thus protected against the currents from the transmitters at their own station and at adjacent stations with less than 10 per cent difference between the frequencies of the transmitters and receivers.

The presence of these loop resonant circuits in the receiver branches does not interfere with the tuning of the branches to the frequencies to which the latter are required to respond; in fact, the loop resonant circuits assist in such tuning.

The arrangement of receiving apparatus shown in Fig. 3 shunts the currents from the neighboring transmitters out of the receiver by means of branch circuits separately made resonant, one to each of the frequencies generated at adjacent or nearby stations.

The arrangement of Fig. 4 is typical of the induction balance circuit which can be used to render a receiver irresponsive to the currents generated by the transmitter at the same station. In this arrangement, the branch *GO* is separately tuned to the receiver's frequency. The device *A* is one having adjustable resistance, inductance and capacity, and whose vector impedance may be made to correspond to any scalar multiple of the vector impedance of the line measured from the point *P* outward. The transmitter and receiver branches *OG* and *PD* respectively are conjugate, the vector product of the vector impedance of the branches *OP* and *DG* being equal to the vector product of the vector impedance of the branch *OD* and that of the line. Bridges of this kind must be balanced both for the resistances and for the reactances of the branches.

It is evident that when the conditions tending to produce interference in a receiver by a neighboring trans-

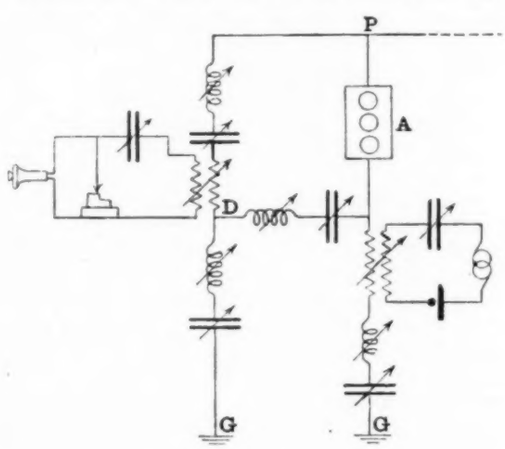


FIG. 4.

mitter are exceptionally severe, the methods of freeing the receiver from such interference shown in Figs. 2 and 3 may be combined in the receiver without any difficulty. With a receiver so protected against "cross talk," the amount of energy of the current to be excluded may be millions of times greater than that of the current to be received and differ from the latter in frequency by but a few per cent without causing the least interference.

A most important feature of both existing telegraphy and telephony is the centralization of the current supply, and this feature is, fortunately, most easily realized in the new high-frequency telegraphy and telephony. The author has devised several ways in which the centralization of the energy may be practically accomplished. Only two of these ways need be referred to here. In the first, the high-frequency generators are connected in series in the circuits at the central office, and each is shunted by a number of branch resonant circuits. Each branch circuit is separately made resonant to a different one of the several frequencies of the currents used on the line other than that of the current developed by the generator it shunts. Another practical mode of

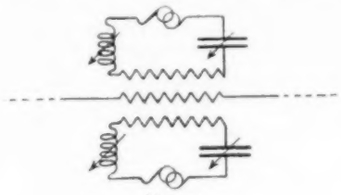


FIG. 5.

centralizing the energy is shown in Fig. 5. The several generators, each in a local circuit tuned to its own frequency, are brought into inductive relation with a transformer secondary in series or in parallel with the telephone or telegraph circuit. The generators in the centralized energy system develop higher potentials than those designed to be used at sub-stations, or else the voltage of the generator is stepped up to the desired voltage.

An allied arrangement, first suggested by Dr. Louis Duncan, contemplates using the high-frequency current only on trunk circuits. In this arrangement a telegraph or telephone relay at the central office translates the telegraph or telephone message bearing current from the existing sub-station line equipped with its local or centralized battery supply into a high-frequency telegraph or telephone current on the trunk circuit, and, conversely, the high-frequency telegraph or telephone current on the trunk circuit is translated from that circuit to the local or sub-station battery circuit by a telegraph or telephone relay or by a rectifier. It is of interest to note that the most serious objections to the telephone relays lose their force in this application, because the telephone relay so used need not amplify the telephonic transmission, and it is in its function as an amplifier that the telephone relay has met conditions which have brought it into disrepute.

No more than a passing reference has here been made to the extremely important fact that multiplex high-frequency telegraph and telephone systems may be superposed on existing telegraph and telephone circuits without bringing about the least mutual interference between the old and the new systems. This subject and its important practical aspects will not be further dwelt upon here because it has received a fairly complete exposition at the hands of Major Geo. O. Squier.

In the new high-frequency telegraphy or telephony, when used by itself, either as a simplex or multiplex, the call and automatic circuit control mechanism generally need not be different from that in use today in the older systems; but in lieu of this the call may be effected by a very flexible system of selective low-frequency electric signaling over the same line. This system of selective signaling has long been known, but there is just one new feature, however, which should be mentioned, namely, that by the addition of rectifiers in the local branch signal

receiving circuits the author believes that he has overcome the principal hindrance to the practical application of the system in the past. By this simple device the call at each station may be sounded by a vibrator bell of a uniform pattern.

When the high-frequency system is used in conjunction with, and on the same line as, the existing system of telegraphy and telephony, a separate high-frequency call or signaling system is preferably used. This call or signaling system is identical with the high-frequency telegraph system itself, except that it operates a local battery call device, such as a vibrator bell or buzzer, instead of operating a telephone receiver, and for this reason it is necessary that the calling current manifest more energy at a distant station than does the corresponding high-frequency telegraph or telephone current under similar conditions. To accomplish this purpose a relay of great sensibility and extreme sluggishness of action is used in conjunction with a rectifier in a tuned local circuit at the receiver station. The relay which the author has found best to meet this requirement is of the Weston moving-coil type.

A great advantage enjoyed by the new high-frequency telephone system over the existing system is in the important particular of distortion. Considerably more attenuation than is now tolerable could be permitted in existing telephone systems were it not for the distortion that usually accompanies it. In the new high-frequency system of telephony, attenuation, though greater than in the older system, brings with it no distortion whatever, due to the fact that but a single frequency is involved.

Another signal advantage of the new high-frequency telephone system over the existing system lies in the silent line which it enjoys, and telephone receivers of several thousand ohms are used, having correspondingly greater sensibility than the low-resistance receivers now in use. The absence of distortion and the silent line of the new telephony remove the chief obstacle to the use of the telephonic amplifier at or near the receiving end of a long line to compensate for the weakening effects of attenuation on the current.

The most serious obstacle to the successful use of the new high-frequency telegraph and telephone is undoubtedly the excessive attenuation or progressive weakening of its current as it flows along the line, particularly in cable circuits, and, unless countervailing or remedial conditions can be found, the use of these high-frequency systems must be very materially restricted through being confined to relatively short lines. The average frequency of the ordinary telephone current is about 800 cycles per second, but the highest harmonics range between 4,000 and 5,000 cycles, and it has been found that it is necessary, for the complete clearness of articulation of the transmitted speech, to conserve harmonics up to about 1,500 cycles. The highest useful frequency in ordinary telephony is, therefore, about one-tenth of the lowest frequency which Major Squier's experiments seem to indicate as possibly practicable for the new telephony, and about one-seventieth of the highest frequency regarded as practicable by Major Squier for the new system. In making comparisons of the attenuation in the old and new systems these ratios should be borne in mind.

Since, in the new system of telephony, a greater current is thrown on the line than in the existing system, and since, further, a receiver of very much greater sensibility is employed, evidently a considerably greater attenuation of the current of the system is permissible than could be tolerated in the old system, and when, further, the absence of noise, the absence of distortion, the absence of side tone, and the absence of reflection of energy from the receiving end of the line are taken into consideration, it seems conservative to estimate that the maximum practical permissible attenuation length in the new telephony is 6.9, as compared with 4.6 in the existing system.

Before leaving the subject of the attenuation of high-frequency waves propagated along conductors, the author shows that the expressions for the attenuation constant and the wave-length or wave-speed on copper open-wire circuits are much simpler than in the case of waves of lower frequencies.

As regards the "loading" of telephone lines, the method of loading lines by uniformly distributed inductance would seem to be available for the high-frequency systems of telegraphy and telephony, but it suffers from several disadvantages. In the first place, it is ill adapted for open-wire circuits; in the second place, it renders cables excessively heavy and bulky; in the third place, it is impossible to pre-determine the attenuation constant of such a circuit, and, in the fourth place, there is evidence tending to show that when a cable so loaded is used in connection with high-frequency currents the dissipation of energy due to hysteresis in the iron wrapping will largely, if not wholly, compensate the beneficial effects of the increased inductance of the circuit.

The use of the other system of loading lines would seem to be precluded by the expense involved. The number of loading coils used would have to be about 70 times as great for the 100,000 frequency current of the new system as is now used on the basis of approximately 4.5 coils per wave-length for a current of 1,500 frequency.

Since, for equal degree of loading of the line in the new and the old systems, the inductance of the coils used for currents of 100,000 frequency would be but one-seventieth of that of the coils used in the old system, it might, at first glance, seem as if the coils would be correspondingly cheaper, and that, consequently, the disparity in the cost of loading the line in the two systems would result chiefly from the greater cost of labor in installing the more numerous coils in the case of the new system. But this conclusion is not justified, because the time constant of the coils in the case of the new system must be as great as in the older system, and the bulk, weight and cost of coils depend far more on their time constants than on their inductances.

The very fact that many trunk circuits are already loaded with coils for the improvement of the existing system bids fair to interfere with the extension of the high-frequency system to these lines. To apply the high-frequency system to a line which is loaded for the existing system it becomes necessary to shunt the loading coils by condensers which shall act practically as a short-circuit to the loading coils for the high-frequency currents and which shall act practically as an inappreciable shunt to them for the low-frequency telephone current. The cost and inconvenience of this would probably not offset the advantages to be gained from the increased effective number of circuits secured; but, however this may be, it is a fact that, so far as can be seen at present, the high-frequency system will not be applied to more than one circuit on a pole line or in a cable, and this one circuit could be left unloaded without great loss.

The Law and the Telephone

By E. J. Wenner

UNINCORPORATED ASSOCIATIONS—MEMBERSHIP—TRANSFER OF OWNERSHIP.

SINCE the event of unincorporated mutual farmer telephone companies, wherein ownership is vested in owners of farms, the question of the right to succession upon the change of ownership of a farm.

The case of Cantril Telephone company et. al. v. Fisher et. al., 138 *Northwestern Reporter* (Iowa), 436, hereinafter reviewed arises in the District Court of Van Buren county, Iowa, and is the first of such cases to come to the attention of the writer, which has been carried to the supreme court of a state.

This matter is of such general interest to telephone men that it is thought best to quote at length from the opinion of the supreme court, leaving out such matters as the writer considers not of interest to the general reader:

Suit in equity to enjoin the defendants from connecting with and using the telephone line of plaintiffs, appellees. A temporary writ was issued and served. The defendants filed an answer and cross-bill. They also prayed in their cross-bill for an injunction to enjoin the plaintiff from disconnecting them with the telephone line. Later the defendants filed a motion to dissolve the temporary writ of injunction issued upon the prayer of the plaintiffs, and a further motion asking for the issuance of a writ of temporary injunction in their own behalf. These motions came on for hearing in vacation. Both motions were denied, and the defendants appeal from such order. Affirmed.

Evans, J.: We avail ourselves of the following statement of the case contained in appellant's brief:

"The plaintiff, the appellee, Cantril Telephone Company, is an unincorporated and acting association, claiming to be organized and acting under written articles of association, inaccurately called 'by-laws.' Those articles, signed by sixteen persons, are not only crude and inartistic, but in and of themselves alone fail to show the real purposes and objects of the organization, and are especially silent as to the means and procedure by which the objects and purposes, whatever they may be, are to be effected. But, when the articles are supplemented by the acts and operations under them by the association, it quite fairly appears that the objects and purposes of the association are not pecuniary profit, but the supplying of telephone conveniences in the homes of members of the association at a price not exceeding actual cost. The terms 'stock of said company,' 'stock,' 'stockholders,' and 'share of stock' are frequently used in the articles, but evidently inaccurately. Manifestly, by the term 'stockholders,' is meant the members of the association, and by the term 'stock,' the privileges appertaining to membership. One becoming a member had to pay $12 (afterwards seemingly raised to $40), which should properly be styled a membership fee, and the money so raised was doubtless used in constructing the line, and any surplus applied on operating and other incidental expenses. A member had the right to connect one phone with the association's wires, and thus have the use of the association's lines and connection for such use, having from time to time to pay such assessments as the association should make to meet the expenses of maintenance and operation.

"The articles contain these provisions:

"'Art. 2. The number of shares shall be limited to the number of phones said line will carry and do good service.

"'Art. 3. Each stockholder shall have the right to put in but one 'phone and shall have the use of said line for such 'phone under such regulations as may be adopted by the board of managers.' Abs. 19, line 25.

"'Art. 14. No member shall be allowed to own more than one share of stock nor shall he be allowed to sell his share of stock until after he has offered it for sale to the company (except in case such stockholder should sell his farm, in which case the purchaser of the farm shall have the first chance to purchase such stock), at a price not to exceed the original cost of the share. Any share of stock so purchased by the company shall be held as common stock of the company, but can be sold or rented by the company to any person who is not a stockholder at the time of purchase.'

"In the case at bar, at the time the line in question was constructed, one H. H. Barnett owned the W. ½ of N. E. ¼, section 7, township 67, range 10, in Van Buren county, and said line was constructed along the south end east side of said land; and he, being a member of the association, by virtue of such membership, connected a phone in the dwelling house on said lands with said line, and while he owned said lands continued to use said phone and line. On October 28, 1909, said Barnett entered into a written agreement with the defendant B. T. Fisher, whereby he sold said lands, 'together with all appurtenances thereto belonging' to the defendant, and pursuant to said contract on November 5, 1909, deeded, by warranty deed and without any reservations, said lands to defendant Fisher, who under said deed went into possession and has ever since been in possession by a tenant."

We are asked by the appellants not to prejudge the final merits of the case on the ground that the record is not sufficient for such purpose. It is the contention of the defendants that the plaintiff company knowingly brought a lawsuit, and that it undertook to make itself the judge of a controversy between Fisher and Barnett. The following excerpt from appellants' brief concisely presents their point of view:

"It, or its smart Alecs, thought the company could, by use of a pressure that Barnett could not bring to bear, bring Fisher to a nunconditional surrender—that is, Barnett could not disconnect the phone, the company could, and, doubtless as the smart Alecs thought, Fisher would surrender before suffering disconnection. But they didn't know Ben Fisher. We now broadly assert that the granting of and the refusal to dissolve the injunction issued on the part of the plaintiff was an abuse of injunctional procedure, regardless of whether Fisher's good faith claim of ownership may or may not be finally determined in his favor. And it was, we assert, an abusive refusal to exercise a wholesome power, when the court refused to grant the temporary injunction prayed for by Fisher and Struble. Fisher and Struble have an unqualified right to a full final hearing without being forced to a choice of either renouncing their claimed right or of suffering irreparable injury. The company cannot be allowed to become the judge between Fisher and Barnett, and then decide in Barnett's favor, put itself in Barnett's place, and by a kind of duress force Fisher to yield—enforce against Fisher a pressure Barnett could not enforce."

Careful examination of the record satisfies us that the defendants' view of the case as thus expressed is somewhat distorted. Barnett was a member of the plaintiff company. He sold his farm to the defendant Fisher, and executed a warranty deed therefor in the latter part of November, 1909. The theory of appellants is that the warranty deed as a matter of law carried to the grantee the membership in the plaintiff company as an appurtenance to the land. This claim is based to some extent, also, upon the provisions of sections 14 of the articles of the company. It is clear that, in the absence of section 14 of the articles, the mere conveyance of the land by warranty deed could not of itself confer membership upon the grantee in the plaintiff company. It is conceded by appellees that the sale of the land to Fisher carried to him a right or option to purchase the "share" of Barnett, and to become a member of the plaintiff company. The trial judge was justified in finding from the affidavits before him that in the negotiations for the sale of the land Barnett had solicited Fisher to buy his "share" in the plaintiff company, and that Fisher declined to do so. For the first year after the purchase, Fisher's tenant paid to Barnett the rental provided for in section 14. In the spring of 1910 the company refused to buy from Barnett because it desired that Fisher should buy the same and become a member. One year later it bought the share from Barnett under the provisions of section 14 for $24. It knew at this time that Fisher claimed that his warranty deed carried all of Barnett's rights to membership in the plaintiff company, and that he refused to purchase it in any other way, and refused to pay rent therefor. The plaintiff company has always been ready and willing to admit Fisher to membership upon payment for the "share," and otherwise, willing also to permit him and his tenant, Struble, to use the phone upon payment of the usual rent. The defendants refuse to do either. The sum of $24 therefore measures the full substance of this controversy. If

the plaintiff company made itself a judge of the controversy between Barnett and Fisher, it did no more than the defendants forced it to do in protection of its own rights. Under the provisions of section 14, an option was reserved to the company to purchase such share. A failure to exercise such option would amount, under such section, to an implied permission to Barnett to sell to whomsoever he could. The company had a right under such section to refuse such permission by exercising such option itself, and there is nothing in the record to impeach its good faith in such course. Such course on the part of the company did not settle or prejudge any controversy as between Barnett and Fisher. The plaintiff company was justified in refusing to become involved in such controversy, and to require the parties to it to settle it between themselves. If Fisher's contention is sound that he purchased the share from Barnett by force of his warranty deed, he had an abundant remedy as for breach of warranty after the sale by Barnett to the company and he could have safely paid the company the $24 which it paid Barnett in exercising its option. By this manner he could have saved himself the complaint that the company made itself a judge of the controversy. On the other hand, if the company had assumed to accept his contention and to receive him into membership on the strength thereof, it could not escape a part in the controversy. In such case it must apparently decide to whom the share belonged. The company did not arbitrarily refuse membership to Fisher. It recognized his right under section 14 to purchase Barnett's share. But it insisted upon an uncontroverted purchase, and not a controverted one, before accepting Fisher into membership in lieu of Barnett. It was a bona fide and reasonable exercise of its power over its own membership. Presumptively it could not accept Fisher into membership in lieu of Barnett without Barnett's consent. It never had Barnett's consent. Section 8 of the articles provides for a record of stockholders, and that no stockholder shall be released from the liabilities of the company "until the change be indorsed on the records by the secretary." Whatever rights Fisher may have acquired under his warranty deed, it is clear that he did not thereby become a de facto member of this association. Further action was necessary on his part for that purpose. He could not be deemed a member against his will by mere force of his warranty deed. And in like manner some action was necessary on the part of the plaintiff company indicating its assent to the change of membership. We had occasion to consider this question to some extent in Staples v. Hobbs, 145 Iowa, 114, 123 N. W. 935. We there held that the alleged purchaser had not established his membership in the company. Applying to the case before us our holding in the Staples case, it is quite clear that Fisher has never become a member of the plaintiff company. His right to connect with the telephone line is dependent upon his membership. The plaintiff company has been guilty of no arbitrary act or bad faith to prevent his acquiring membership in a proper way. The only relief he prays for in his cross-bill is that the plaintiff company be enjoined from interfering in any way with his connections with the telephone line. Upon the record before us, he is not entitled to such relief and the trial judge properly so found.

The order of the trial court is therefore affirmed.

CONTRACTUAL RIGHTS—JUST AND UNJUST DISCRIMINATIONS.

Plaintiff brought an action against the defendant to recover $1.00 per month for thirty months for telephone service. The defendant admitted the service, but pleaded a contract entered into prior to the enactment of the public utility law of the state of Wisconsin to the effect that such service should not exceed $10.00 per year.

In 1902, defendant subscribed for and purchased one share of the common stock of the plaintiff company of the par value of $50.00. He paid a premium of 10 per cent and was given a contract by the company to furnish him telephone service for not more than $10.00 per year. In 1908 no assessment was made against defendant's stock. In 1909 an assessment of $10.00 was made and a like amount again in 1910.

Upon demand by plaintiff, defendant refused to pay the amount claimed on the theory that his contract fixed his liability. The telephone company claimed that the public utility law abrogated the contract and obliged it to charge him the same as other subscribers. Hence the claim for $30.00.

The supreme court in commenting upon the terms of the public utility law stated that it was a mere incorporation of the common rule into written law. The act specifically recognized the existence of special contracts and provided that "the furnishing by any public utility, of any product or service at the rates and upon the terms and conditions provided for in any existing contract executed prior to April, 1907, shall not constitute a discrimination within the meaning specified.

Commenting further the court said:

The foregoing seems to cover everything which needs treatment on this appeal. The case presents the question of whether a mere special contract with a public utility corporation for services made prior to the time limit mentioned in section 179m91—one not inhering in a corporate franchise, and so superseded by the public utility law; but, an ordinary agreement for service, recognized as valid and expressly given validity by such section—cannot be relied on by one party thereto as binding on the other seeking to repudiate it. No reason is perceived why the answer should not be in the affirmative as it was below.

The judgment is affirmed.

People's Telephone Company v. Lewis, 138 *Northwestern Reporter*, 100.

Transfer of Jurisdiction Asked in Bill

A bill which would take away from the New York Public Service Commission of the second district its jurisdiction over telegraph and telephone lines, and place it in the hands of the commission of the first district, is the subject of a letter to the Chamber of Commerce, requesting that the chamber help fight it.

The grounds upon which the proposed change in jurisdiction is based, at least ostensibly, are explained in the followig recommendations which were made to the legislature by the committee appointed to investigate telephone and telegraph conditions in the state:

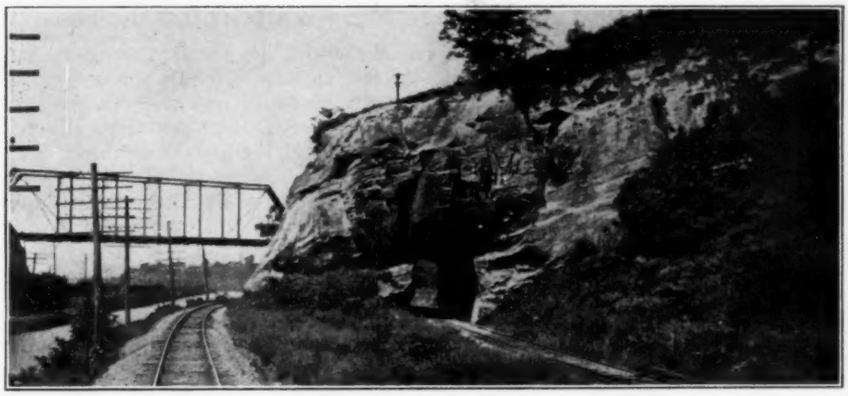
Your committee recommends the passing of a law which will give to one of the existing public service commissions of this state jurisdiction over and supervision of telegraph and telephone companies and telegraph and telephone lines, rates, services and finances; and in view of the fact the location of the office of the public service commission of the second district is in Albany, the state capital, and in view of the fact that this point is nearer the geographic and commercial center of the state, your committee recommends that such jurisdiction be given to the public service commission of the second district.

A further reason for giving such control is that it will be more economical in that there will be needed in that office only one bureau of telephones and telegraphs, and only one corps of inspectors, engineers and statisticians looking after the details of the work.

Your committee also recommends that the law provide that the first district commission be given authority to hold public hearings in any part of the state, and that it be authorized in its discretion to maintain a branch office in any city of the first and second class.

Cheap Telephone Rate in Copenhagen

Local telephone rates in Copenhagen, Denmark, vary from $8 to $50 per year, with many intermediate grades, to suit different conditions of service. Charges are not assessed on a unit basis, but by groups of 1,000 or 2,000 calls per year, except for the cheapest service, where unit charges amounting to about 1 1/3 cents per call are made. As a result of the low rate, the percentage of telephones per thousand population is greater in Denmark than in any other country of Europe.



DEPARTMENT of RAILWAY TELEPHONES

Britain's First Railroad Telephones

Rhymney Railway Installation

BRIEF mention was made in the March number of TELEPHONE ENGINEER of the new telephonic train control system put into operation on the lines of the Rhymney Railway Company, which extends from Cardiff into the eastern and western valleys of Glamorganshire, Wales—the first telephone train control system on the British Isles. Through the courtesy of the London *Electrician*, we are able to present a more detailed description of the system and its features peculiar to British railway practice.

Progressive railways are ever seeking to improve their methods of handling trains, especially in those districts where mineral and goods traffic is heavy or complicated. Both the telegraph and the telephone are already employed by many railways to deal with the problem of efficient traffic control, but the Western Electric Company's system, recently installed by Messrs. J. B. Saunders & Company on the Rhymney railway possesses a number of important features not found in many other systems, and a short account of the working will therefore be of interest.

The control of the traffic on a railway line or section of line is, as a rule, assigned to one man, the "controller," whose office is situated at some important point on the route. A pair of wires is run from this office along the line and, at signal cabins and other points where traffic is dealt with, telephones are looped across the wires. These telephones are equipped with a device known as a "selector," the function of which is explained later. The controller himself wears, while on duty, a head receiver and chest transmitter, which allow him to receive and to transmit telephone messages and to use his hands at the same time. In front of him the controller has a cabinet fitted with a number of keys or switches. Each key is associated with one of the signal boxes or way stations, with its telephone set and selector. These keys are so arranged that when actuated they send a series of impulses along the line, the current being supplied by the battery fitted at the controller's office. The number of impulses sent out differs with each key, the keys being adjustable, so that the required number of impulses may be set.

The selector at the signal box or way station consists essentially of an electromagnet fitted with an armature which actuates a small pawl, which in turn rotates a small ratchet wheel. The ratchet wheel is fitted with an adjustable contact, so arranged that it is closed after a certain number of teeth have been rotated. The effect of the controller operating one of his keys is, as stated above, to send out a series of impulses of current along the line. Each of these impulses causes the armature of the selector to be pulled up and then released, and each time that the armature is so pulled up, it actuates a stepping pawl and moves the ratchet wheel forward one tooth. All the selector ratchet wheels along the line operate at the same time, but as each of them have the contact set at a different point, after a definite number of impulses have been sent out and the ratchet wheels have come to rest, on only one of them will the contact be closed, and thus the ring is given only at a certain station. By an ingenious arrangement of the electrical circuit the ratchet wheel is locked in one direction by a retaining pawl, during the time that the current impulses are on the line. This allows the wheel being stepped forward tooth by tooth, but prevents the wheel from falling back when the stepping pawl returns to engage with a fresh cog. After the ratchet wheel has been stepped round to the correct position, contact is made and the bell rings. All the ratchet wheels then fall back to their normal positions ready for a fresh call.

In order to get the most efficient speech transmission over the line, special telephone circuits

Department of Railway Telephones

This department is established as a permanent feature of TELEPHONE ENGINEER. The progress of the art of telephone train dispatching, its technical development, its news, and the elucidation of its mysteries for the non-technical worker will be found each month in these pages. The editors invite the problems and solicit the co-operation of the many readers of TELEPHONE ENGINEER in all parts of the world whose interests lie along these lines.

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have been devised, and as many as 40 telephones can now be looped across one pair of wires, so that anyone speaking at one station can be heard perfectly clearly at all the others. This special telephone circuit has made it possible to provide a general call scheme which is very useful for simultaneously giving daily instructions to all the wayside stations. The general call scheme is arranged as follows: In addition to the contacts on the selectors already described for selecting the particular bell required, a second contact is fitted on each. This second contact is set at the same position on all selectors, say, for example, on the fortieth tooth. An extra key is fitted at the controller's office, this key sending out in this example 40 current impulses. When this key is operated all the selectors step round 40 teeth, and all the contacts for general call are made so that the bell in each station rings and the controller is enabled to give general instructions to all stations at the same time.

When one of the wayside stations requires to speak to the controller, it is only necessary to remove the receiver from the hook, listen to ascertain if the line is already in use, and, if not, to speak directly to the controller, as in the ordinary way the caller always has his telephone connected across the line. In cases where the controller may not be constantly listening on the line, a magneto bell can be fitted at his office and the wayside stations can be supplied with a hand magneto generator, so that they can ring up in the ordinary way. A further addition, which is usually made in connection with this system, is a time-sending arrangement. Each of the selectors is fitted with an additional contact which is "made" when the ratchet wheel has rotated a complete revolution. This is used by the controller for sending out signals for the regulation of clocks, etc. By simple modifications of the circuit, the selector system may be made to serve other useful purposes in connection with railway working.

Working in connection with the apparatus above described the Rhymney Railway Company has installed immediately in front of the controller a table upon which a diagram board of the whole railway is fixed, showing the up and down lines separately. On this board the movement of all engines and trains is recorded by the controller from time to time, as advices reach him, by the sliding of brass discs bearing the number of the particular train from position to position. Provision is made in the diagram board at the more important junctions, stations and sidings, for sliding the discs from the grooves representing the running roads into side tracks when the engines are detained shunting and the like. The controller is supplied with information as each engine picks up or puts off traffic at the various junctions and sidings, and he can at any moment see the exact position of the trains working throughout the railway and is thus able to divert engines to any particular point where traffic is waiting clearance or prevent them making unnecessary journeys to points where traffic which was expected is not in readiness for bringing forward.

The Queen & Crescent Railroad Company, of Cincinnati, O., is planning to equip its division from Ludlow to Williamstown, Ky., a distance of 35 miles, with electric train dispatching and block signal systems. Electric lights in all stations along the line will also be installed. Telephone service will take the place of the present telegraph in dispatching.

The Western Maryland Installs Telephones

The Western Maryland Railroad Company has joined the ranks of the railroads using the telephone for the dispatching of trains and has recently ordered equipment for its lines from the Western Electric Company. This road, which is an exceedingly busy one, especially since the opening of the Pittsburgh extension, is used principally in the hauling of coal, coke and other freight, and also handles passenger traffic.

The apparatus to be used is the No. 102 type selector set containing the well-known No. 50 selector. Twenty-three way-stations will be equipped with selective signaling and telephone apparatus. Miscellaneous equipment and line material is also being furnished.

The present equipment will be installed over a circuit extending from Hagerstown to Cumberland, Maryland, a distance of eighty miles. This section of road is the first of four hundred miles to be equipped with telephone train dispatching apparatus.

Telephone System on Rock Island Extended

That the use of telephoning in train dispatching is increasing is evidenced by the completion of a through telephone service on the Rock Island between Silvis and West Davenport. In order to facilitate in dispatching of trains within the Rock Island yards of the three cities, East Moline and Silvis, the telephoning system of dispatching has been increased to the extent of fourteen miles of wire, together with the necessary new instruments, giving complete service from Silvis to West Davenport.

Instead of going back to the telegraph system of dispatching trains the Rock Island is extending the use of telephones, according to a statement given out by the division superintendent's office. The telephone has been in service for the past two and a half years on this road, and, though the telegraph instruments have been retained, they are being used for other business.

Railway Superintendents to Convene

The next annual convention of the Association of Railway Telegraph Superintendents will be held in St. Louis, Mo., May 20, and active preparations are now being made for the gathering. Many matters of importance to the railway telegraph and telephone service will come up at this meeting for attention and discussion, and there is every indication that the meeting will be a most profitable one from a technical standpoint. P. W. Drew, superintendent of telegraph of the Minneapolis, St. Paul & Sault Ste. Marie Railway, Chicago, Ill., is secretary of the association and is ready to give any further information regarding the meeting.

Australia's Novel Train Telephone

A novel system of train telephone service is in use on the Mendel Railway of Australia. It permits the locomotive engineer to send bell signals to the different stations along the road. A telephone is installed in every car, which is connected to the line by the opening of the telephone case, and connections are made along the telephone wires at the side of the track by a specially constructed trolley which projects from the locomotive cab.

Of Interest to the Trade

By A. L. Haase

Roush Self Clamping Anchor Rods

Considerable interest is being manifested among line construction men in the self clamping anchor rods and clamps recently placed on the market by the Roush Anchor Rod Company. These rods and clamps are made in two styles. Style A, known as the "Roush self clamping wire adjusting anchor rod" and style B, known as the "Rousch threadless self clamping anchor rod."

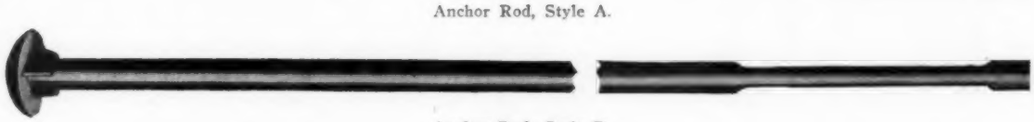
These devices are especially unique in that in addition to combining all of the necessary and essential features of "dead man" anchors and of guy clamps in the rod proper, the clamps in both styles A and B are self clamping, thus avoiding the numerous bolts and nuts ordinarily required in wire clamping, while the turn buckle feature in style A enables one man with a wrench to tighten the guy to a strain greater than can possibly be produced by three men with block and tackle.

By reducing the pieces required in guy clamping and anchoring to four, in style A, and to three, in style B, the wonderful simplicity of these devices is at once apparent. These different parts in each style are assembled as a unit for shipping and for convenience in handling, thus avoiding the expense of assembling and the trouble so often experienced of "missing parts." None but the experienced line construction man can thoroughly appreciate a device that will forever do away with the annoyance and inconvenience caused by the different parts in clamping and anchoring being delivered on the job each in separate units.

In style A there is combined in one simple device an anchor rod, wire clamp, thimble and turnbuckle. The rod has at its base a solid head with fins, and when driven upward into the "dead man" is held absolutely stationary. This does away at once with all detachable or movable parts underground and places the entire working part of the device where it can always be seen and easily handled, thus enabling the work of tightening and adjusting the wire to be done with great ease and effectiveness.

The clamp in this device is self clamping. This self clamping feature is produced by the strain of the guy against its tightening force. The guy wire after being brought through the clamp, washer, and nut is placed in the groove in the rod. It is then brought upward and placed in the groove on the outside of the clamp and thence around the rod between the washer and clamp where it becomes self clamped by the tightening up of the screw which forces the washer against the pulling strain upward of the clamp. It can be seen from this that the strain of the guy wire regulates the necessary tightness of the clamp, thus if a strain of 5,000 pounds is put on the guy wire, the clamp will tighten to hold a strain of 5,000 pounds, making it impossible for the guy wire to slip or give. The thimble is stationary in the clamp, and for this reason the guy when being applied cannot turn it or slip off of it as it does with other thimbles in use.

Anchor Rod, Style A.



Anchor Rod, Style B.

Clamp, Style A.

Clamp, Style B.

The turnbuckle feature of this device, produced by the simple adjusting of the nut, takes the place of the block and tackle in the placing and tightening of the guy wire. The work of applying the wire and tightening the guy is all done by one man in a remarkably short time, and with great ease and effectiveness. Special attention is called to the ease with which two or more wires requiring the same strain can be adjusted, also the ease with which guys can be tightened or adjusted that have become slack because of long usage or from other causes.

In style B the base of the rod is the same as in style A. The upper portion of the rod, commencing one inch from the top and extending downward six inches, is slightly flattened for the reception of the clamp. The

top of the rod above the flattened portion serves as a head to hold firmly the clamp from slipping off the rod. The top part of the clamp in style B has an eye of wrought iron cast in it to which are fastened the blocks. Through the base of this part of the clamp is an oblong hole so shaped at one end as to receive the top of the rod, and narrowing in proportion to the flattened portion of the rod so that the clamp fits snugly in this flattened portion, allowing the wide part of this hole to extend outward after the clamp is placed on the rod—for the reception of the guy wire, which after being placed locks securely the clamp to the rod. The lower part of the clamp is placed on the rod and receives the guy in the same manner as the upper part, and is so designed as to form a perfect thimble. The guy wire is applied to style B in the same manner as to style A, and becomes clamped between the upper and lower parts of the clamp when the strain is released by the loosening of the block. It can at once be seen that the clamping feature in style B is identical with that of style A, the holding force of the clamps in both cases being in proportion to the tightness of the guy.

Style B is entirely void of nuts, bolts, washers and threads. The time consuming features in connection with tightening up of numerous bolts are done away with. The tightness of the clamp is always in proportion to the strain on the guy—hence, as stated in connection with style A, the clamp automatically tightens to hold any amount of strain placed on the guy. The clamp becomes locked to the rod and can only be removed by releasing the guy entirely from the clamp.

A Strong Business Course and Service

A large number of business men throughout the country have recently become interested in the Alexander Hamilton Institute course and service in accounting, finance and management. The Alexander Hamilton Institute was organized a few years ago in New York City by a group of executives and of university specialists in business subjects. Its course is in large part a development from the work of university schools of commerce and finance. Like the university courses, it has been planned as a broad executive training along business lines. The course includes a study of economics, organization and management, accounting and cost systems, corporation finance and financial practice, real estate and insurance, advertising, selling, credits and commercial law. The advisory council of the institute consists of these five men: Dean Joseph French Johnson, the head of New York University School of Commerce; Jeremiah W. Jenks, of New York University; Frank A. Vanderlip, president of the National City Bank of New York; Elijah W. Sells, of Haskins & Sells, one of the best-known firms of accountants in the country; and Henry R. Towne, president of the Yale and Town Manufacturing Company.

The course is conducted by a staff of men, most of whom are members of university faculties. They are practical specialists in various fields of business activity, who combine with their practical experience the educational experience necessary to make the course interesting and instructive. The basis of the course is a series of twelve text-books, which constitute a comprehensive and readable digest of present-day principles and practices of business. The editor-in-chief of the series is Joseph French Johnson, dean of the New York University School of Commerce. The authors he has chosen are specialists, each of whom ranks as an authority in his own field. Although these books have been issued only a short time, they have already been recognized as the most important single contribution yet made to business literature and have been adopted as text-books in the courses in business subjects at about forty leading universities, including Yale, Cornell, Dartmouth, New York, Syracuse, Pittsburg, Northwestern, Illinois, Michigan, Minnesota, Wisconsin, Iowa, Nebraska, Texas and California. The course covers a period of two years, during which the reading of the text is directed by a series of bulletins, issued at intervals of two weeks in booklet form and prepared by members of the institute staff. The assignment of reading each two weeks is calculated to fit the average business man's spare time. The reading is paralleled by a series of monthly problems, which give the men who follow the course an opportunity to apply the principles studied to actual business situations. An interesting feature in the work of the institute is its reporting service, through which subscribers to the course may secure special reports on business subjects from the specialists connected with the institute staff.

The Alexander Hamilton Institute now numbers among its subscribers about 10,000 business men connected with important corporations and financial institutions throughout the country, including such representative concerns as the United States Steel Corporation, American Locomotive Company, Westinghouse Electric and Manufacturing Company, Stone & Webster, H. M. Byllesby Company, Burroughs Adding Machine Company, and National City Bank of New York. Over 500 men connected with the American Telephone & Telegraph Company and its subsidiary companies are now following the course, besides a large number associated with leading independent companies throughout the country. As the work of the institute becomes better known, this number is sure to increase rapidly, because the institute is meeting in a practical way a real need on the part of busy business men for authoritative and complete information on business subjects.

The work of the institute has applied with special force to men connected with large corporations, whose work is necessarily specialized and does not offer the opportunity for gaining that broad grasp of business conditions and business methods that is essential in executive work in those corporations. Interest in this work has been just as great among men in the operating end as among men in commercial and accounting departments.

The following is a brief description of the text of the Alexander Hamilton Institute course in accounts, finance and management:

1. Economics of Business: A practical exposition of the science of business with illustrations from actual experience, by Edward Sherwood Meade, professor of finance in the Wharton School of Finance and Commerce of the University of Pennsylvania.

2. Organization, Correspondence, Transportation: The principles underlying successful business organization and management, by Lee Galloway, professor of commerce and industry in New York University School of Commerce, Accounts and Finance; with chapters in business correspondence, by G. B. Hotchkiss, instructor in business English in New York University School of Commerce, Accounts and Finance; and chapters of transportation practice and rate-making, by James Mavor, professor of political economy in the University of Toronto.

3. Accounting Practice: A comprehensive statement of accounting principles and methods, illustrated by modern forms

and problems, by Leo Greendlinger, C. P. A., professor of accounting in New York University School of Commerce, Accounts and Finance.

4. Corporation Finance: An exposition of the principles and methods governing the promotion, organization and management of modern corporations, by William H. Lough, professor of finance in New York University School of Commerce, Accounts and Finance.

5. Money and Banking: A discussion of the laws fixing the general level of prices and wages, with descriptions of important monetary systems and of modern credit institutions in Europe and the United States, by Earl Dean Howard, professor of finance in Northwestern University School of Commerce; in collaboration with Joseph French Johnson, dean of New York University School of Commerce, Accounts and Finance.

6. Banking Practice and Foreign Exchange: A description of modern banking methods and the laws governing their organization and operation, by J. M. Jefferson, lecturer on banking in New York University School of Commerce, Accounts and Finance, secretary and treasurer of the Windsor Trust Company, New York; and a discussion of the technique and principles of international monetary operations, by Franklin Escher, lecturer on foreign exchange in New York University School of Commerce, Accounts and Finance, financial editor of *Harper's Weekly*.

7. Investment and Speculation: A description of the modern money market and an analysis of factors determining the value of securities, by Thomas Conway, Jr., professor of finance in the Wharton School of Finance and Commerce of the University of Pennsylvania, in collaboration with Albert W. Atwood, lecturer on investments in New York University School of Commerce, Accounts and Finance.

8. Insurance and Real Estate: A practical treatise on the conduct of the fire insurance business, by Edward R. Hardy, lecturer on insurance and insurance law in New York University School of Commerce, Accounts and Finance; with a practical treatise on the conduct of the real estate business, by Walter Lindner, lecturer on real property in New York University School of Commerce, Accounts and Finance, general solicitor of the Title Guarantee and Trust Company, of New York City.

9. Advertising, Selling, Credits: An exposition of advertising as an art and as a business, by Lee Galloway, professor of commerce and industry in New York University School of Commerce, Accounts and Finance, in collaboration with G. Howard Harmon, vice-president of the Morse International Advertising Agency, lecturer in New York University School of Commerce, Accounts and Finance; a discussion of selling practice, by R. S. Butler, assistant professor of business administration in the University of Wisconsin; with chapters on credits and collections, by Lee Galloway.

10. Accounting Systems: A description of the accounting methods best adapted to the needs of various business institutions, by Edward P. Moxey, Jr., C. P. A., lecturer on accounting in the Wharton School of Finance and Commerce, of the University of Pennsylvania.

11. Auditing and Cost Accounts: A discussion of the duties of the auditor, with practical exercises in accountants' reports, by Seymour Walton, C. P. A., professor of accounting in Northwestern University School of Commerce, with a treatise on the principles of cost accounting, giving concrete illustrations, by Stephen W. Gilman, professor of business administration in the University of Wisconsin.

12. Commercial Law: A treatise for business men on the law applicable to commercial relations, with digests and cases by Charles W. Gerstenberg, LL. B., lecturer in New York University School of Commerce, Accounts and Finance, member of the New York bar, in collaboration with Thomas W. Hughes, LL. M., professor of law in the University of Illinois.

The course and service of the institute are very interestingly discussed in a stimulating booklet on "Organized Business Knowledge," by Joseph French Johnson. The booklet may be had without charge by addressing the secretary, Alexander Hamilton Institute, Astor place, New York City.

Orders were issued from the Ohio Public Service Commission for the sale by the Central Union Telephone Company of toll lines and toll circuits in and about Lima to the Lima Telephone and Telegraph Company. The consideration is $205,000.

The Rope Broke, the Anchor Held

The photograph was made during a test of a Vote-Berger "Drive and Twist" anchor. A No. 2 anchor of this type was driven and twisted in the ordinary way of regular practice. To the eye of the anchor a ⅜-inch messenger was firmly attached. Then to the messenger was made fast a block and tackle arrangement, so that every strain, within reasonable limits, could be thrown on the anchor in the direction which would obtain under working conditions. The messenger, of the ordinary ⅜-inch kind, represented a tensile strength of about 6,000 pounds. Something over this figure was applied before anything gave way, and it was the messenger that finally broke at the critical moment. The anchor did not move.

An Interesting Anchor Test.

Philadelphia to Own Telephone Line

As a result of a dispute with the Keystone Telephone Company over the refusal of the city of Philadelphia to pay an increase for telephone service, Director Porter, of the department of public safety, stated that the city, to protect its interests in the future, would construct its own telephone service, the approximate cost of which will be $70,000.

Until just recently the wires of the Keystone Telephone Company were used exclusively by the department of public safety in transmitting official messages to police stations. The company demanded an increase in payment for the services, which Director Porter and Chief Pike of the electrical bureau refused to pay. The company retaliated by disconnecting the direct service wires between the electrical bureau and the police stations, and since then the lines of another telephone company have been used.

"While the present service is satisfactory," continued the director, "the department would prefer to have the Keystone Company's wires, which, being direct, assured absolute secrecy for police messages."

Missouri Pacific Dispatches by Telephone

Telephones are used conjointly with the telegraph to dispatch trains and transmit messages on the Missouri Pacific.

The central office is at Falls City. To call any other office on the line, one must first call central. The new system will be used, together with the telegraph, more and more as the operators become accustomed to handling messages on it.

The telephone system on the Missouri Pacific operates only between Kansas City and Omaha, but it is planned to extend it all over the western lines. The telephone has supplanted the telegraph in the operation of trains on the Santa Fe and Frisco main lines and on many other roads.

Automanual in the Ohio Floods

While a full realization of the horrors of the Ohio and Indiana floods is not possible without being actually on the scene, there are a number of cities which were more or less affected by the destructive conditions whose experience would be interesting, although they are of course overshadowed by the tremendous loss of life and property in those cities more directly in the path of the floods.

E. G. Miller, Manager.

A letter received by the Telephone Improvement Company, from E. G. Miller, manager of the Warren & Niles Telephone Company, is very interesting as it details the experience of one company operating the Automanual in the flooded district. Fortunately the Warren exchange is laid out with the battery on the second floor of the building instead of the basement, or the maintenance of service under these trying conditions would have been vastly more difficult. The operating room is on the ground floor and the switch apparatus on the second, so that the patrons of the Warren & Niles Telephone Company in Warren were reasonably sure of service even if the flood had reached the operating room and driven away the female operators. In that case General Manager Miller, with characteristic resourcefulness, would no doubt have put hip boots on his trouble men and assigned them to duty at the Automanual operators' desks.

There is nothing quite so important at times of disaster as the maintenance of telephone service, and it is worthy of note that while handling 35,000 calls per diem it was only necessary for Mr. Miller to provide for supplying five or six operators instead of twelve or fifteen.

The experience of the Warren & Niles Company illustrates the importance of having an engine driven generator in central energy exchanges as well as the usual source of power depending on the electric light and power circuit.

Finally, the Warren & Niles Telephone Company is to be congratulated upon such a signal triumph over its competitor as the uninterrupted maintenance of service under the most discouraging conditions, and upon the demonstration of resourcefulness and energy upon the part of the organization under Mr. Miller to combat the most unfortunate operating conditions successfully.

Mr. Miller's letter is quoted below verbatim:

The Warren Exchange of the Warren and Niles Telephone Company (Automanual) Where the Flood Occurred.

Warren, Ohio, March 28, 1913.

Knowing that you would be interested in the very unusual and almost calamitous condition that Warren has passed through

in the last three days we are writing you the details that would be of chief interest.

There were but a few people drowned, so in that respect Warren is blessed above many of the other towns, some of which have reached a horror point.

The continued rains of four days rapidly raised an already high river to some three or four feet beyond that it had ever attained before. The worst was that the electric lighting plant was put out of business on Monday evening at about 8 o'clock and the illuminating gas failed us the next morning. The water in the meantime had been steadily rising and commenced to show in our cellar. We kept the gas engine running until the water came up and touched the fly wheel and compelled us to shut down. At that time one battery was almost exhausted and the other was only about ⅓ charged. We took the dynamo off the foundation and placed it up on a table and three feet off the floor, but on Tuesday morning the water had gotten up within one inch of the dynamo. We then had the fire department pump the cellar for us, thinking we could fight the water and keep it out; but after getting the level down to about 12 inches we saw it would be impossible to run the gas engine. We then took the dynamo upstairs and mounted it in a shed directly back of the exchange and ran our lead wires through the cellar while the water was still low enough so we could do the work in wading boots. We then hired a 4 h. p. gasoline engine and finally charged our batteries and have been keeping them in condition with our gasoline engine up to this morning. We are now about to set the dynamo on its old foundations and getting back to old running conditions.

The most interesting part of this to you, however, will be that on Tuesday, the day when the water was reaching its highest, we carried a load of 34,000 calls; the following day we had 30,000 calls and yesterday 23,500. I am sorry that I cannot give you the actual number of operators on duty during the various hours, but it would only be guessing at it to attempt that. Most of the time we had four desks, sometimes five, and during that very busy day six desks in operation most all the time. We feel rather proud of the fact that the water did not put us out of business either in Warren or at Niles.

It is a very lucky thing for us that we were not dependent upon the local lighting company for our power. The Bell Company common battery plant in Niles had been out of business practically for the last three days. Both of the companies in each of the towns will suffer very heavy losses by reason of the unusual conditions breaking poles, etc. The Bell Company in Warren will have to replace about 20 of its poles on West Market street broken by the flood. I think we have one or two poles on the same street that are broken, but our condition is nothing like as serious as that of the Bell Company and will not be nearly so much of an expense to repair.—Warren & Niles Telephone Company, *E. G. Miller, Mgr.*

Solving the Mine Telephone Problem

From the sewing machine to the mine telephone is a far cry; but there is an analogy in the mental processes which were followed in making a machine that would sew and a mine telephone that would remain operative in spite of the severe service conditions encountered underground. The task of producing a sewing machine became easy when Howe hit upon the idea of putting the eye in the point instead of in the head of the needle. In solving the problem of making a serviceable telephone for mines, the Western Electric Company's engineers reversed the method of "keeping the eye in the needle's head," and attempting to keep moisture, gases, acids, etc., out of the sets, and merely built them so that moisture and gases would not injure the various parts if they could get in. The result is a telephone that will give as good service down in the mine's depths as will the one that stands on the mine superintendent's desk.

It may be well to remember that the general use of the telephone in ordinary business affairs introduced a tremendous economic saving, which may be epitomized in just two words—"Time Saved." If this is true when applied to the every day uses, it is even more so when applied to a mine in which the steps saved are steps which are infinitely more difficult to take than would be those taken in the course of any other kind of business. The installation of electric power by mine represents a very large investment, but this is amply justified by the increased economies of operation. The investment in a telephone system is, of course, less than that entailed by installing power machinery, but measured from the standpoint of the return on investment, the former is at least as profitable as the latter.

Not only is a telephone system an actual necessity in the efficient operation of a mine, but it is also of invaluable use in emergencies and accidents. In fact, it is safe to say that the telephone is the mine operator's greatest help in his fight to reduce the loss of life, that ever-present factor in mining operations. This does not mean that an installation of telephones will necessarily prevent accidents; but it does provide a means for instantly summoning help. In case of fire, the telephone furnishes a means for warning all the men in the mine and directing their escape, while often in cases of explosion, some of the instruments, if they have been made properly, can still be used for warning

A Modern Protected Mine Telephone.

and directing. In fact, the Bureau of Mines in its second annual report, in dwelling upon the need of refuge chambers, states: "Even if nothing more than several mine rooms or chambers were utilized, these could have tight-fitting doors in duplicate, and a protected telephone."

The modern mine telephone, as made by the Western Electric Company, fulfills the requirement of a "protected telephone." All apparatus is enclosed in a very substantial cast-iron case, heavily japanned inside and outside and equipped with two doors. This combination makes the set fire-proof, rust-proof and moisture-proof when closed. The iron case is also curved at the top so that water or any other foreign matter falling upon it will easily slip off. The line wires may be brought in either at the top or bottom of the case. When brought in at the top, the wires run in through a curved inlet which works as a drip loop to prevent water from getting into the set.

The outer door protects the transmitter mouthpiece, receiver and generator crank, the only parts visible when this door is opened, while the second or inner door protects all the apparatus within the case. Electrically, the set is the same as an ordinary magneto instrument containing practically the same apparatus. Here, however, the resemblance ceases as the mechanical features are entirely different. Besides being en-

cased in a cast-iron box every piece of apparatus is individually and thoroughly treated to protect it against the inroads of moisture and corrosive mine water and gases.

The generator springs are covered with asphaltum paint. The generator terminals are mounted on a hard rubber block and after connections are made, they are covered with a water-proof compound. Switch-hook springs and ringer terminals are covered with asphaltum paint and compound respectively. The induction coil is mounted in a hard wood case whose parts are boiled in linseed oil before they are put together. These boxes are not glued but are fastened by means of brass screws, while the spaces between the sides and the induction coil are filled with water-proof compound.

To prevent battery trouble, the cardboard cartons are thoroughly impregnated with water-proofing compounds to prevent the absorption of moisture which would otherwise short circuit adjacent cells. To safeguard the batteries still further and prevent them from coming into contact, circular holes, each large enough for one cell, are provided in the wooden block under the batteries. All wiring is done with Habirshaw red rubber core cable, fastened with insulating tape and treated with asphaltum paint. Every exposed iron part is triple electro-galvanized.

Electrical Industry in Europe

The ever-increasing use of electricity has made the manufacture of electrical instruments and meters an important and highly specialized industry with many complex problems. In view of this fact, the Bureau of Foreign and Domestic Commerce dispatched H. B. Brooks, an expert of the United States Bureau of Standards, as commercial agent to make a study of this industry in Europe, where much pioneer work has been done in electrical measurements. Mr. Brooks visited the principal manufacturers and obtained such information in regard to their organization, methods, and products as would be of interest to American makers and users. In his report, which has recently been issued by the Bureau of Foreign and Domestic Commerce as Special Agents Series No. 66, the works of thirty-one leading European firms are described. Attention is given to the equipment, the number of employes, the hours of labor, and the nature of the products manufactured. Copies of the bulletin may be obtained by application to the Bureau of Foreign and Domestic Commerce at Washington.

Testimony for the Matthews Anchor

A Matthews salesman was recently asked by a prospective customer why he should purchase Matthews guy anchors in preference to any of the several types of anchors which are offered for less money, but which require the digging of a hole before their installation. The salesman replied that there had been at least fifty-seven varieties of the digging type anchor placed on the market since 1902 and at present time there were only four of these on the market, and three of these four were less than a year old. The customer stated that he had seen some demonstrations made of the holding power of these anchors and was very favorably impressed thereby. The salesman called his attention to the fact that the continual strain on the poles, together with the lurching of the line, has a tendency to pull the anchors up into the soft filled hole directly above them. He pointed out that this was inevitable because of the fact that water from rain and melting snow would follow the easiest path in seeking its level and would, therefore, fine its way down through the filled earth in the tubular hole above the anchors, softening the sides of the solid earth surrounding it, so that the lurch of the line would pull the anchor up into the eroded and filled earth above it. The Matthews guy anchor does not disturb the solid earth any more than a cork-screw disturbs a cork, therefore, there is no pathway for the water to follow, and the anchor has no moving parts to adjust. The Matthews guy anchor has been used in increased quantities by pole using companies since 1899 and every year since that time has shown an increase in their sale over the year previous. In the year 1912 the increase was 59 per cent over 1911.

The salesman gave the prospect five names of construction men and asked him to call them up on the telephone and ask their opinion. Each one of the five men whose names were given reported very favorably. Each one of them had used Matthews anchors over three years and one had used 20,000 in the last seven years. The salesman then wired J. J. Montgomery, general superintendent of the Jasper County Telephone Company, as follows:

> Will you kindly wire Mr. Blank of Blank Company your experience with Matthews guy anchors in January, 1913, giving full details? Prepay charges and send the bill to us at St. Louis.

Two hours later the prospect received this telegram:

> We are very much pleased with the performance of the 6-inch Matthews guy anchors purchased of W. N. Matthews & Brother three years ago. We are using them on leads consisting of 20 and 25-foot poles with 6-inch tops. We had ice weighing eleven ounces to the foot in January. The spans were 130 feet and consisted of 10 No. 12 B. B. galvanized iron wires. The poles were wind-storm guyed every quarter of a mile with 6-inch Matthews guy anchors. All corners were guyed the same, head and side, with two 6-inch Matthews guy anchors and with 5/8-inch guys. Not a single anchor pulled and we consider our small loss solely due to the holding ability of these anchors. We are more than satisfied with them.

This was a case where analysis of a clean record of 13 years under actual working conditions by the prospective customer, prompted him to buy the higher priced of the two articles for the same purpose, in spite of a demonstration of the lower priced article, which appeared to be satisfactory on the data furnished by a block and tackle test.

Results of 30-Year Fight Unsatisfactory

Neither the Western Union Telegraph Company nor the American Bell Telephone Company, who have been fighting for the past thirty years over a $7,000,000 suit brought by the telegraph company, have been awarded any satisfaction by Judge William L. Putnam of the United States Circuit Court of Appeals, who affirmed the decision of Judge Colt, from which both sides appealed two years ago.

Judge Colt awarded the Western Union $3,141,529.11 and 17,885 shares of stock in various subsidiary telephone companies controlled by the American Bell.

This decision was apparently distasteful to both parties, as the telephone company declared the award was excessive and the telegraph company said it was not enough. The latter claimed approximately $7,000,000 and over 30,000 shares of stock.

The only recourse left is the United States Su-

preme Court. Whether or not the case will be taken there is not known, but it is regarded as doubtful in view of the fact that both companies are now merged in the American Telephone and Telegraph Company.

It is reported that three years ago the telephone company set aside about $5,000,000 to meet any adverse decision by the court.

Thompson-Levering Busy

Since removing to a bigger factory at 323 Arch street, the Thompson-Levering Company has been doing a big business.

The assembling rooms have been enlarged and tools and equipment put in for several additional high grade instrument men, Mr. Levering personally supervising every detail of the work.

The adoption, as standard, of the T.-L. instruments by big telephone and telegraph companies is a good testimonial to the quality of product turned out by the company.

A new bulletin is just off the press illustrating a decade instrument of remarkable efficiency and can be had for the asking.

Dividend Declared by Stromberg-Carlson

The board of directors of the Stromberg-Carlson Telephone Manufacturing Company at a recent meeting declared a fourth liquidation dividend of 10 per cent on the preferred stock of the company. This dividend will be paid on or after April 1 to stockholders of record at the close of business March 22. The dividend will be paid at the office of the company on presentation of the stock certificates.

The amount of this dividend will be $150,000. With this dividend paid, the preferred stockholders will have received $40 on the par value of each share, and in addition $40.83 of accrued dividends on each share, a total of $1,212,450, most of which has been paid within the last eight months. The balance still to be paid on the preferred stock of the company is $60 per share, or a total of $900,000.

Michigan Commission News

Lawton T. Hemans, chairman of the Michigan State Railroad Commission, addressed the State Legislature, pointing out the weakness of present laws relating to the supervision of telephone operation. The Giles law, intended, he said, to give the commission complete control over telephone companies in some directions, fails especially in according it power to enforce interchange of messages between systems. Advocating short-term advance payments, Mr. Hemans said he felt it unjust to force companies to furnish service to every applicant without some protection.

Wisconsin Commission News

Upon complaint that the service rendered by the Wausau Telephone Company was inadequate and that its rates were excessive, the Wisconsin Commission has ordered the utility to take steps to improve its service and to this end has ordered that an accurate and complete record be kept of all trouble incident to service, with reports of the same at stated intervals. No order was made regarding rates, as the present earnings were not sufficient to warrant a reduction.

The Peoples Telephone Company, of Rio, has been authorized to abandon its present rate of $1.00 per month and to substitute therefor a schedule of rates ranging from $1.75 per month for single-party business service to $1.40 per month for three or four-party business service and from $1.50 to $1.00 per month for residence service. The company's present practice of giving free exchange service through more than one central was ordered abolished. On account of the poor condition in which the company's accounts have been kept, the commission's order will not go into effect until such time as the utility installs a system of accounts conforming to the classification prescribed by the commission.

Some Optimistic Letters

Editor TELEPHONE ENGINEER.—We find present conditions very good and the future looks promising. Our sales so far this year show a substantial increase over the sales of one year ago and last year's business was considerably in excess of the preceding year. We have a larger volume of unfilled orders on hand at this time than we had one year ago and there is every indication that the increased volume of business will continue indefinitely.

Many customers who for the past two or three years have held their construction work down to a minimum are now planning extensions to their systems, as is evidenced by the number of inquiries we have had for quotations and also the number of orders received for branch exchange switchboards, private branch exchange switchboards, intercommunicating systems and telephones. Many other customers, who installed magneto exchanges prior to 1902, are planning to rebuild within the next two or three years with Central Energy equipment. Many of our customers are planning development in unoccupied territory around them.

We have built up a good stock of standard switchboards and telephones in preparation for the spring demand, but we are gratified to report that we find our customers are anticipating their requirements better than herefore and that less rush shipments are required.—W. ROY MCCANNE, Secretary and Treasurer, Stromberg-Carlson Telephone Mfg. Co.

Editor TELEPHONE ENGINEER.—We are happy to say that business with us for the last year has been much better than it was for the year before. Telephone sales by months since last July have been from ten per cent to fifty per cent better than the corresponding months of the previous year. We believe that business conditions are improving in all lines, and that the telephone business is getting merely its share of the increased prosperity.—Chicago Telephone Supply Company, per G. A. BRIGGS, President.

Editor TELEPHONE ENGINEER.—We find business in our territory very encouraging. The way we feel regarding the future will be evidenced by certain arrangements we will make in the near future to take care of our increasing business. We are not prepared at this writing to state just what these arrangements will be, but they comprise an increase in our facilities whereby our customers will be assured of prompt shipments in a more extended line of telephone apparatus than we have furnished heretofore.—The Sumter Telephone Manufacturing Company, by H. R. VAN DEVENTER, Sales Engineer.

Editor TELEPHONE ENGINEER.—I am glad to say that from the reports and results that are coming now there is apparently a very strong feeling that there will be another wave of independent telephone construction all through the country immediately and that where new independent plants are now built there will be a great deal of municipal work done and also a great deal of rebuilding of old plants. The business outlook for this year, and apparently for several years to come, is, therefore, about the best it has shown in perspective for several years.

Every man at the recent convention seemed to be enthusiastic and courageous and each one seemed to feel that he was going to get his share and possibly more than his share of the present greatly improved business conditions. In these respects, therefore, the outlook is distinctly helpful and encouraging.—Ericsson Manufacturing Company, F. W. PARDEE, Vice-President and General Manager.

Brevities of the Business

PERSONAL NOTES.

Alfred Stromberg, organizer of the Stromberg-Carlson Telephone Manufacturing Company, one of the largest of its kind in the United States, died at his home, 5442 Sheridan road, of apoplexy. He had been ill three weeks. Mr. Stromberg was born near Stockholm, Sweden, March 9, 1861. He learned the telephone business in Sweden. In 1883 he came to Chicago, identifying himself with the Chicago Telephone Company. While in its employ he made some improvements in apparatus, notably in the automatic hook switch, which were regarded as meritorious. He was employed by the Western Telephone Construction Company of Chicago, one of the first independent manufacturers, and in 1896 associated with Androv Carlson, also a Scandinavian, and a former fellow employe of the Chicago Telephone Company, he organized the Stromberg-Carlson Telephone Manufacturing Company, of which he was made president. The business of this company was very successful almost from the start. It was based at first on the inventions and practical ideas of Stromberg and Carlson, but as the business developed a staff of designers was employed. The growth of the company was very largely due to Mr. Stromberg's great energy and the real genius he displayed in the design and manufacturing of telephone systems. The company was capitalized for $50,000, but in 1902 the business was sold out to a group of Rochester (N. Y.) capitalists for $750,000. The new owners retained the services of Mr. Stromberg for three or four years, but he gradually withdrew from the business and returned to Chicago. In that city he organized several years ago the Stromberg Electric Company, which manufactures electric time stamps, and he also was largely instrumental in the organization of the Stromberg Motor Devices Company, which makes carburetors and automobile accessories. Mr. Stromberg possessed a magnetic personality and was popular among independent telephone men. He was a thirty-third degree Mason, a Knight Templar and a member of the Union League Club of Chicago. He is survived by a widow and four children.

D. H. Johnson, who has been district superintendent of the West Penn Company in Washington, has gone to Butler, where he holds a similar position with the same company.

C. A. Cook, district manager of the Bell Telephone Company in St. Joseph, Mo., has received a certificate of membership in the Telephone Pioneers of America, an organization of telephone men who have been in the service of the Bell company twenty years or longer. Mr. Cook completed his twentieth year's service March 1.

Charles E. Hall, general commercial superintendent of the Iowa-Nebraska Telephone Company, is promoted to be general manager of the Iowa-Nebraska and Northwestern Telephone Company. The latter embraces the states of Minnesota, North and South Dakota.

Harold B. Porter, superintendent of the plant department of the Bell Telephone Company of Pennsylvania, has been transferred to the main office of the company at Harrisburg. About 50 employes of the plant department gathered in the Continental Hotel and held a banquet in Mr. Porter's honor. Felton Taggart of the right-of-way department was toastmaster and responses were made by F. L. Lancaster, William Eipper, F. C. Moody, P. W. England and H. N. Reeves.

D. F. Turnbull, manager of the Southern Bell Telephone Company in Birmingham, Ala., was elected a director in the Merchants and Mechanics Trust and Savings Bank. The election was by the board of directors, composed of many representative business men, and was unanimous. Mr. Turnbull is widely known in business circles.

C. S. McGowan of Superior, Wis., has gone to Fargo, N. D., to take the position of district foreman with the Northwestern Telephone Company. He succeeds G. F. Babcock, who is manager of the local exchange at Willmar.

Howard Maxon has taken possession of the Independent telephone at Minden, Neb.

Hugh B. Gilmore, for more than a year manager of the Illinois Toll Clearing Association at Springfield, has resigned the position. Mr. Gilmore's resignation becomes effective April 1. He has not announced his future plans. The Illinois Toll Clearing Association is formed of the independent telephone companies of the state.

W. O. Seals of Atlanta has been appointed district traffic manager of the Cumberland Telephone & Telegraph Company, with headquarters at Columbia, Tenn. He will have charge of twenty-eight exchanges in this district.

E. F. Brown, formerly Bell district plant chief at Jacksonville, Fla., has been transferred to the engineering department, Atlanta, Ga.

H. J. Pettengill, president of the Southwestern Telegraph and Telephone Company, St. Louis, Mo., paid a winter visit to Panama with a party of St. Louis business men, who made the trip via special train and special steamer.

E. J. Hall, vice-president of the American Telephone and Telegraph Company, of New York, spent the past month at Florida, with headquarters at Miami.

C. Montague, who has been manager of the Bell Telephone Company's office at Parkersburg, W. Va., for the past five years, and manager of the joint office of that company and the Western Union Telegraph Company since last May, has been transferred to the Washington, Pa., office. Edward Reiser of Wheeling, W. Va., will succeed Mr. Montague as manager of the joint offices at Parkersburg.

E. C. Bradley, vice-president and general manager of the Pacific Telephone and Telegraph Company, has announced his intention of resigning at the annual meeting of the stockholders March 5, with a view of retiring from active life, after forty years' service. He started as a telegraph operator and in time became third vice-president of the Postal Telegraph Company. Later he was associated with the American Telephone and Telegraph Company in Boston and New York, and then came to the Pacific Telephone and Telegraph Company.

J. M. P. Hansen, district plant chief of the Joliet (Ill.) branch of the Chicago Telephone Company, has been appointed to the position of toll-line inspector of the entire Chicago Telephone system, comprising five counties in the northern part of the state, including Chicago and Cook county. He began his new duties on March 1. Mr. Hansen has been in the service of the company for 22 years. He was connected with the Joliet office for 12 years, going there as wire chief of the local branch.

Homer R. McClatchey, who has been appointed district commercial manager of the Rome, Ga., district of the Southern Bell Telephone Company, has been manager of the Marietta, Ga., exchange during the past nine years, and is qualified by experience and ability to assume the enlarged duties.

William G. Merowitz has severed his connection with the Holtzer-Cabot Electric Company to become power apparatus sales specialist for the Northern Electrical and Manufacturing Company of Montreal, Canada.

Francis W. Dunbar, consulting electrical and telephone engineer and patent expert, has moved to room 1334 Monadnock block, Chicago.

E. W. Moister, auditor of disbursements, American Telephone and Telegraph Company, New York, was killed in the subway, March 12.

F. H. Bethell, vice-president of the New York Telephone Company, was the speaker of the evening at the one hundred and forty-third meeting of the Telephone Society of New York, which was held at the Engineering Societies building on Tuesday evening, March 18.

F. C. Moody, who has been plant superintendent of the Harrisburg division of the Bell Telephone Company of Pennsylvania, with headquarters in Harrisburg since January 1, has been promoted to plant superintendent of Philadelphia. H. B. Porter of Philadelphia has been promoted to the plant superintendency of the Harrisburg division and has assumed his new duties.

H. W. Ebel, who has been connected with the Bell Telephone Company in Washington for the past fifteen years, has tendered his resignation, to accept a position as district superintendent of the West Penn Electric Company at McDonald. Mr. Ebel is well known in Washington. He has held nearly every position possible about a telephone office, and is one of the best informed telephone men in this section of the state.

Theodore N. Vail, who is spending a holiday at Jekyl Island, is expected to return to New York early in May.

J. C. Nowell, general superintendent of plant, Bell Telephone Company of Pennsylvania, Philadelphia, has been elected general manager of the Pacific State Telephone and Telegraph Company, with headquarters at San Francisco, and has left Philadelphia to assume his new duties.

Harry Babbitt, a well-known electrician of Washington, who has been holding the position as district superintendent of the West Penn Electric Company at McDonald, has been transferred to Washington, holding a similar position there.

L. H. Jacobi, for the last six years manager of the Alameda

division of the Pacific States Telephone and Telegraph Company, has resigned his position after being with the company over forty years. Jacobi has been succeeded by John Koordt, who has been with the company for several years as chief collector. Jacobi was formerly a head office chief, but left the head office at the time of the first merger and consolidation of the old company with the Pacific States concern. He later accepted the management of the Alameda division and has been extremely popular by reason of his unfailing courtesy. His retirement at this time is due in part to the ill health of Mrs. Jacobi, and his future plans are at present undetermined. He will retire on pension on account of his forty years of efficient service for the company.

Charles S. Meek, former manager for the D. & M. Telephone Company at Alexandria, Ind., who became manager for the Bell company when it purchased the D. & M. system recently, has resigned to accept another position.

L. B. Wilson, the head of the western district of the Nebraska Telephone Company, with headquarters in Grand Island, has succeeded Guy H. Pratt as commercial superintendent of the Nebraska Telephone Company, with headquarters in Omaha. Few men are better posted on telephone conditions in western Nebraska than Mr. Wilson, who has been exceedingly industrious in his work for the company.

George E. McFarland, general manager of the Iowa-Nebraska Telephone Company, has been promoted to the presidency of the Pacific States Telephone and Telegraph Company, with headquarters in San Francisco. Mr. McFarland was also vice-president as well as general manager.

A. C. Ludington of Ishpeming, Mich., formerly manager of the Marquette County Telephone Company, has been appointed by K. S. Baker, district manager, to a new office, that of district commercial agent for the Michigan State Telephone. Mr. Ludington's duties will take him to all parts of the district as general representative of the company, having general supervision of the commercial department under Mr. Baker.

Former Manager John A. Roper of Johnson City, Tex., has resigned as manager for the Willow City Telephone Company. Dennie Oatman succeeds him.

Fred Manthei, a manager of the Wisconsin Telephone Company, has gone to Delavan, Wis., and assumed the management of the station there. This change is in the nature of a promotion, as the Delavan position is one of the best in the state.

Guy H. Pratt, division commercial superintendent of Nebraska for the Iowa-Nebraska Telephone Company, has been appointed general commercial superintendent, succeeding C. E. Hall. Mr. Pratt formerly was division commercial superintendent of Iowa.

Charles E. Woodruff, former district commercial manager of the Rome, Ga., district, has resigned to become general manager of the Christian-Todd Telephone Company, with headquarters at Hopkinsville, Ky. He has been manager at Rome during the past eleven years. Prior to that time he was manager of the Western Union Telegraph Company for fourteen years.

J. N. McNair has been appointed manager at Marietta, Ga., to succeed H. R. McClatchey, has been in the service of the company for nine years. He was located at St. Augustine and later at Jacksonville, Fla., in positions which he filled in a creditable manner. He has already won many friends in Marietta and he promises to be personally popular and successful in this important position.

Urias J. Fry, aged 65 years, superintendent of telegraph, Chicago, Milwaukee & St. Paul Railway, Milwaukee, Wis., died February 23. He was a native of Urichsville, Ohio, and learned telegraphy in 1873-1874. In 1884 he became connected with the Chicago, Milwaukee & St. Paul Railway, and has been associated with that interest ever since, receiving the appointment of superintendent of telegraph October 1, 1888. He was one of the best known railway telegraph superintendents in the United States, was president of the Association of Railway Telegraph Superintendents during the year 1893-94 and president of the Old Time Telegraphers' and Historical Association during the year 1902-03. The funeral services were attended by many prominent railway officials and friends.

W. Wasser, who has been manager of the British Columbia Telephone Company, Ltd., at Milner, has been transferred to Nanaimo, succeeding E. Love, resigned. Mr. Wasser has been succeeded by J. Cowley, of the installation department, Vancouver. Mr. Cowley was at one time manager at Hammond. A. B. Curtis of Greenwood has been transferred to Alberni, as manager. He has been succeeded by H. Lunney of the installation department, Vancouver.

Theodore N. Vail, William Endicott, Jr., and Everett Morse of Boston were elected life members of the Corporation of the Massachusetts Institute of Technology at its meeting of March 12, 1913. Mr. Vail is well known as the president of the American Telephone and Telegraph Company. William Endicott, Jr., is a Boston banker and of the firm of Kidder, Peabody & Co. Everett Morss is president of the Simplex Wire and Cable Company. He is a member of the class of '85 and has previously served as an alumni term member of the corporation. At the meeting he was elected a member of the executive committee.

Ralph Haver of Poughkeepsie will succeed R. L. Chapman as manager of the Troy district of the New York Telephone Company, which includes this city, Watervliet, Cohoes, Waterford, Mechanicsville, West Sand Lake and Jonesville exchanges. He comes from Poughkeepsie, where he has been manager for fifteen years.

Joseph Walker is the new manager of the Wyaconda telephone exchange, succeeding Joseph Deiterich, who resigned.

CONSTRUCTION.

AUBURN, MICH.—The Michigan State Telephone Company has commenced work on improvements to its plant at Auburn, the most important part of the work being the replacing of open wires with about 800 feet of aerial cable, similar to that in use in Bay City.

BOWIE, TEX.—A new telephone exchange is to be installed by the Southwestern Telegraph and Telephone Company.

CHICO, CAL.—That Chico is to have one of the most up-to-date and modern telephone systems in the West is the statement of W. S. Kelly of the Sacramento division office of the Pacific Telephone and Telegraph office, who has just completed a stay of a week in Chico looking over the territory with a view of expansion.

CLARKSVILLE, ARK.—The Southwestern Telegraph and Telephone Company is installing a modern telephone plant at Harriman. This will give the Southwestern people five plants in the county, all of which are well equipped.

CLIFTON, ARIZ.—Work is expected to begin shortly on an extension of the Mountain State Telephone line, connecting Clifton and Duncan with Silver City. This will give Clifton long distance connection with El Paso and Denver. Another long distance link is also to be constructed from Clifton to Safford.

CROWLEY, LA.—The Sibil Telephone Company, operating out of Church Point, has sold its holding to a new organization that will extend these lines. Another party line will be extended out from the Cumberland office here to Estherwood and neighborhood.

DEERING, N. D.—The Northern Telephone Company is making extensive improvements at Deering.

DULUTH, MINN.—The Duluth Telephone Company has moved into its new building between Third and Fourth avenues West on First street.

DURAN, N. M.—Robert Bourne, owner and manager of the Duran Telephone Company, has completed a 36-mile extension of his telephone line to three of the largest sheep ranches in this vicinity, the O. K. Ingrahm, Tom DeBoise and Goldenberg ranches. Recently Mr. Bourne purchased the Vaughn Telephone Company's property at Vaughn and is overhauling the line and exchange, and installing new telephones.

HORNELL, N. Y.—After months of work, the Erie Railroad Company has completed the wiring of the Susquehanna division and installing a telephone system to run the trains over the division instead of the time honored telegraph instruments. The installing of the telephone system cost approximately $50,000.

LAFAYETTE, IND.—It has been semi-officially announced that the L. E. & W. will probably install a system of telephones for dispatching during the next few months on the Fort Wayne-Muncie division. The new system is expected to be in operation by June 15. A system has been in use on the main line long enough to prove that it is not only economical, but far more convenient and entirely practical, and all branches of the New York Central lines will probably be so equipped. The system used enables all operators to hear what is going on on the line and also enables the dispatcher to "lock out" all but the station he is talking to, so that there can be no conversation on the line without his sanction.

MORRISTOWN, IA.—The farmers of Morristown and vicinity have taken steps to build rural telephone lines through the region south of Morristown and connecting with the town system.

PADUCAH, KY.—The East Tennessee Telephone Company is planning to expend $300,000 on extensive improvements in Paducah to meet the expected increase of business that should follow the entrance of three trunk line railroads into the city.

PORT ARANSAS, TEX.—Through the efforts of the Commercial Club, the Southwestern Telegraph and Telephone Company will install a submarine cable to the mainland, and probably to Aransas Pass, to give this city better telephone facilities.

Port Huron, Mich.—The city commissioners have granted the Michigan State Telephone Company the privilege to go ahead with its projected improvements in this city. The company will expend the sum of $38,000.

Pueblo, Colo.—A telephone company construction gang started the work of replacing the present line from Pueblo down the valley as far as Boone, a distance of twenty miles, in middle March. It was estimated that it would take six weeks to do the work at an approximate cost of $10,000.

Saginaw, Mich.—Estimates for an expenditure of nearly $200,000 for the extension of lines and the increasing of the capacity of the Saginaw exchange have been approved by the Michigan State Telephone Company. The work will include the laying of several miles of cable conduits and the stringing of many miles of new wires on both the east side and the west side. It will also double the capacity of the company's Saginaw exchange.

San Diego, Cal.—Pacific Telephone and Telegraph Company, alterations and repairs, 951 Sixth street, $250.

Whitesburg, Ky.—The Whitesburg Telephone Company will start at once the construction of a local and long distance telephone line from this city via Colson and Pine Top to Hindman, Knott county. This completed, there will be almost a comprehensive network of telephone lines throughout the eastern Kentucky coal fields.

Winona, Wash.—The Winona Telephone Company has made connections with the St. John lines through Willada. Heretofore the connection was made through Endicott.

NEW TELEPHONE COMPANIES.

Aldrich, Minn.—The Aldrich & Bartlett Rural Telephone Company has been incorporated with a capital of $10,000 by Gust Strom, G. H. Carter and others.

Alliance, Neb.—A meeting was held recently in the Fairview neighborhood for the purpose of organizing a company to construct a telephone line to Alliance. T. J. Lawrence was elected president of the company and William H. Aspden secretary-treasurer. A name was not decided upon at the time of the meeting to organize, but it is understood that it will be known as the Fairview line.

Danville, Ky.—A telephone company has been organized at Parksville, this county. A line will be built to Butchertown, thence to Gravel Switch, where it will be connected with the independent line at that point.

Carson, Va.—Carson Telephone Company, Carson. W. T. Saunders, president; N. H. King, vice-president; J. D. Wilkerson, secretary; R. B. Saunders, treasurer—all of Carson. Capital stock, $500 to $2,500. Objects and purposes, build a telephone line eighty miles long in Prince George county.

Electa, O.—Taylor Telephone Company, Electa. Capital, $100. Incorporators, J. W. Taylor, J. H. Browning, Fannie Williams, Vance Taylor and J. S. Taylor.

Fortville, Ind.—John Bird Telephone Company, Fortville. Capital stock, $300. To build and operate rural telephone line. Directors, Charles Springer, Everett Ogle, John Stokes.

Frankston, Tex.—Frankston Telephone Company, Frankston, Anderson county, $4,500. Incorporators, M. E. Cook, S. G. Jones, J. H. Bragg.

Geneseo, Ill.—Geneseo Munson Main Line Mutual Telephone Company, Geneseo. Capital, $2,500. To operate a telephone system. Incorporators, Allan B. Cady, A. S. Offerle, A. S. McAvoy.

Greenwood, Mich.—The Greenwood Mutual Telephone Company has been incorporated with a capital stock of $1,000.

Kurten, Tex.—The citizens of Kurten, this county, have organized a telephone company and incorporated same with a capital stock of $900. They are installing a regular exchange and will cover the entire community with their wires. Their exchange will be connected direct with the Bryan exchange. The officers of the company are: Rev. J. J. Kasiske, president; Dr. W. G. Drummond, first vice-president; William Monthei, second vice-president; M. B. Easters, third vice-president; Will Payne, corresponding secretary; Dr. W. F. Odom, financial secretary, and August Prinzel, treasurer.

Lakeview, Tex.—Lakeview Telephone Company, Lakeview, Hall county. Capital, $1,000. Incorporators, I. W. Thomason, W. H. Youngblood, H. R. Mullis.

Little Rock, Ark.—Articles of incorporation were filed with the secretary of state incorporating the Logan County Telephone Company of Paris, with a capital stock of $15,000. The officers are S. Webb, president; Earle H. Hunt, vice-president, and J. R. Grounds, secretary and treasurer.

Lyons, N. Y.—Certificate of incorporation of the Richardsons Corners Telephone Company was filed at the Wayne county clerk's office. The company is chartered to construct and maintain a telephone line on Wadsworth street in the town of Wolcott, to extend to the Wolcott town line and connect with the lines of the Wayne Telephone Company. The corporation is capitalized at $525, divided into shares of $35 each, and has a duration of twenty-five years. There are seven directions, Ammon Rice, Joseph Prior, Lewis J. Wilkinson, Milton B. Wadsworth, Everett E. Caster, Arthur J. Eygnor and Fay H. Blauvelt. The principal office of the corporation is to be in the village of Wolcott.

Merrill, Wis.—Farmers in the town of Maine have organized a telephone company and will erect a line which will extend to Merrill and connect with the other lines.

Norway, S. C.—A commission has been issued to the Norway Telephone Company of Norway with a capital of $500. The petitioners are H. P. Fulmer, J. F. Hutto and C. T. Dowling.

Park Rapids, Minn.—The Park Rapids & Straight River Telephone Company has organized with thirty members.

Portville, N. Y.—A new telephone company has recently been organized under the name of Portville Telephone Company, using independent long distance connections. The officers are Edgar T. Caneen, manager; William T. Keller, assistant manager and wire chief; L. J. Henry, secretary and treasurer; B. T. Fairchild and A. D. Glover, trustees.

Salem, S. D.—Salem, McCook county, has a new corporation for telephone line connecting with the Salem exchange, being the Dakota Telephone Company, capital stock $500, and incorporators and directors being Joseph Bartscher, Henry Sabers, Charles C. Wingen, Gava, and Joseph H. Wegner of Salem.

Stoudsburg, Pa.—Hunters Range Telephone Company, Stroudsburg. Capital, $5,000. J. M. Mack, 40 North Seventeenth street, Allentown.

Tahlequah, Okla.—Metory Telephone Company of Tahlequah, Okla. Capital stock, $1,000. Incorporators, John E. Thompson, Tahlequah; Ross Daniels, Tahlequah; Louis Myers, Tahlequah.

Utica, N. Y.—A certificate of incorporation of the Vernon Telephone Company was filed with the county clerk. The new company has a capital stock of $10,000 and proposes to operate in Oneida and Madison counties. The directors of the company are F. H. Tygert, A. F. Brewster, Anna W. Tygert, Julia E. Brewster, D. B. Case, J. D. Shipman and George Capes.

Watertown, S. D.—The Falk Farmers' Telephone Company of Watertown. Capital stock, $7,500. Incorporators, F. Falk, M. P. Gergen, John Falk, M. Falk and L. J. Heyn.

Wyoming, Ia.—The Wyoming Mutual Telephone Company has been organized and incorporated at this place with an authorized capital of $10,000. This is the outcome of the consolidation of the Bear Creek Valley Telephone Company and the Wyoming Telephone Company a few weeks ago.

FINANCIAL NOTES.

Assumption, Ill.—Assumption Mutual Telephone Company, Assumption. Capital stock increased from $5,000 to $20,000.

Beloit, Wis.—The Wisconsin Telephone Company has just paid into the city treasury its license fee for the year 1912, which fee is calculated on a percentage of the gross exchange receipts for that period. The company pays five per cent of eight per cent of such gross receipts. This fee for the period mentioned amounted to $1,333.07. The company paid $152.85 more in fees in this city than it did in Janesville, where the total sum paid into the city treasury was $1,180.22.

McIntosh, Minn.—The Garden Valley Telephone Company has now a capital of $43,000.

Milton Junction, Wis.—The Milton & Milton Junction Telephone Company has increased its capital stock from $20,000 to $50,000, according to an amendment to its articles filed in the register's office.

New York, N. Y.—The syndicate which underwrote the $67,000,000 American Telephone & Telegraph Company convertible 4½ per cent bonds has been dissolved.

Rochester, N. Y.—The board of directors of the Stromberg-Carlson Telephone Manufacturing Company at a meeting declared a fourth liquidation dividend of 10 per cent on the preferred stock of the company. This dividend will be paid on or after April 1 to stockholders of record at the close of business March 22. The dividend will be paid at the office of the company on presentation of the stock certificates, the same as heretofore. The amount of this dividend will be $150,000. With this dividend paid, the preferred stockholders will have received $40 on the par value of each share, and in addition $40.83 of accrued dividends on each share, a total of $1,212,450; balance still to be paid on the preferred stock of the company is $60 a share, or a total of $900,000.

San Francisco, Cal.—The Honey Lake Valley Mutual Tel-

ephone Company has applied for authority to issue $10,000 in notes.

SEATTLE, WASH.—The proposition to issue $2,000,000 in bonds for a municipal telephone plant in Seattle, Wash., has been defeated.

FRANCHISES ASKED AND GRANTED.

AURORA, ILL.—The Interstate Telephone Company is asking for a new franchise in twenty cities in the vicinity of Aurora. Vice-President Barber and General Manager Griffiths have already been in conference with officers of some of the cities. The special telephone committee of the Aurora city council has held one meeting and members are now waiting for the ordinance to be drawn by the telephone company. It will be examined and accepted or amended.

ALTURAS, CAL.—Application has been made to the board of supervisors for a telephone and telegraph franchise in the county of Modoc. Sealed bids will be received up to April 8 for the sale of said franchise.

CROOKSTON, MINN.—The clerk presented to the council a written acceptance of the conditions of the franchise for a long distance telephone as granted by the provisions of ordinance No. 147, which was filed in his office on the 18th day of February, 1913, accompanied by a bond in the sum of $4,000, as required by said ordinance, the Equitable Surety Company of St. Louis, Mo., being the surety thereon, and on motion the bond was approved and placed on file.

INDIANAPOLIS, IND.—The Indianapolis Telephone Company received another time extension of thirty days in which to carry out a provision of the franchise for an expenditure of $500,000 on equipment by March 2, 1912. Up to this time the company has spent $467,000.

JEFFERSONVILLE, KY.—The petition filed by the Home Telephone Company for a franchise to establish and maintain a plant in this city has been referred to a special committee composed of Councilmen B. A. Coll, George Young and E. B. Andres.

NASHVILLE, TENN.—According to K. L. Bernard of New York, the citizens of Nashville are to have the privilege of voting on a new telephone franchise within the next few months. "We expect to have the matter in shape to put before the people within the next ninety days," said Mr. Bernard, who claims that the proposition is already amply financed by eastern capitalists and that in the event the people grant the new company a franchise the new company will install telephones with a charge for service twenty per cent less than at present charged by the Cumberland Company. "After the first two years," he continued, "the charge for telephone service will be thirty per cent less than subscribers are now paying, and after the first four years the charge for service will be thirty-three and one-third per cent less."

OSCEOLA, IA.—Parties appeared before the city council asking that they be granted a franchise for a new telephone system independent of the Bell. The question was submitted to the people at the city election, March 31. Those back of the movement are C. T. Ayers, F. J. Emary and D. M. Gibson. Both rural and city lines are included.

VISALIA, CAL.—An application has been made to the board of supervisors for a franchise for a period of fifty years to erect and operate a telephone line in certain highways of Tulare county. Sealed bids will be received up to April 8 for the sale of said franchise.

GILBERT, MINN.—A telephone franchise has been given to the Range Telephone Company to operate here.

RATES.

BROWNSVILLE, O.—A hearing in the case of the Pioneer Mutual Telephone Company of this city, seeking to have its local rates advanced, was held here before Railroad Commissioner Frank L. Miller, the session lasting nearly the entire day. The company controls the telephone system of this city and branches extending to farming communities, Albany, Lebanon, Halsey, Shedd, Plainview, Crawfordsville and Holley. In order to provide funds to maintain and extend the system the company says it has been found necessary to advance rates on local lines, and it was for this purpose that the hearing was held.

CARLISLE, KY.—The new scale of rates of the Nicholas Home Telephone Company for local service has gone into effect. The new rates are $2.75 for main business line and $1.65 for main residence line, with discounts of 25 cents and 15 cents, respectively, for payment at the office in ten days. The old rates were $1.50 for business and $1 for residence, with 10 cents toll charge for calls in the county outside of the city.

CHICAGO, ILL.—Reduction in telephone toll rates from 10 cents to 5 cents a call between Austin and Oak Park and other suburbs similarly situated was urged at the recent meeting of the council committee on gas, oil and electric light. Professor Edward W. Bemis, the city public utility expert, was instructed to make a report showing how much such a reduction would cost the company.

COLORADO SPRINGS, COLO.—The new telephone rates, announced by the company sometime ago, are now in effect. Business and ten-party telephones remain the same, but for unlimited service residence telephones the reductions are large. One party telephones are now $3 instead of $4; two party, $2.50 instead of $3, and four party, $2; instead of $2.25.

LEXINGTON, KY.—Fayette county telephone subscribers, who are protesting against the increase in rates as announced by the Fayette Home Telephone Company, into which the local lines of the Cumberland Telephone Company have been merged, to take effect April 1, held a mass meeting, at which they rejected the company's proposal and formulated one of their own. They suggest that they will be satisfied with a rate of $1.50 per month on eight-party lines, $2 on four-party lines, $3 on two-party lines and $4 in single lines.

PHILADELPHIA, PA.—Announcement is made by J. Heron Crosman, Jr., general commercial superintendent of the Bell Telephone Company, that the telephone toll rates from Philadelphia to all suburban exchanges in Pennsylvania within an eight-mile radius of the postoffice, Ninth and Market streets, have been reduced from ten to five cents, effective March 1. This will apply on calls from Philadelphia to the following exchanges: Cynwyd, Lansdowne, Llanerch, Melrose, Narberth and Sharon Hill, and on calls from those exchanges to Philadelphia. The telephone toll rate to Camden has previously been reduced from ten to five cents.

HUTCHINSON, KAN.—City clerks of the various towns around Hutchinson report the telephone rates charged in these towns as follows, compared with Hutchinson's rates: Great Bend, business telephones $2, residence $1.50, party line residence $1. Ellinwood, business telephone $2, residence $1, central energy. Salina business telephone $2.25, residence $1.50. McPherson, business telephone $2.50, residence $1.50, central energy. Sterling, business telephone $2, residence $1, Magneto call system. Hutchinson, business telephone $3, residence $1.50 to $1.75, with a discount of 25c if paid by the 15th, central energy.

WATAGA, ILL.—The following new rules have been made for Wataga telephone users: 1. All non-subscribers to Wataga or Galesburg exchange must pay ten cents to talk to Galesburg. 2. Subscribers calling Galesburg must say: This is Mr. ——, so central will know if it is a subscriber or not. If a telephone holder calls for a non-subscriber to talk they must make it known to central. All such calls will be charged to telephones called from. 3. No ringing on lines after closing hours at night to be allowed only for a doctor or sickness.

ELECTIONS.

BIDWELL, IA.—The Bidwell Telephone Company held its annual meeting at Christiansburg. Officers elected for the ensuing year are as follows: President, Frank Johnston; vice-president Burk Williams; secretary and treasurer, Roy Gates. Directors, C. R. Chisman, Gus Seaburg and Alfred Gustafson. Lineman, Henry Oswald.

CREIGHTON, NEB.—The Rose Valley Telephone Company held annual meeting March 1. W. D. Simpson was elected president, A. S. Elliott retiring after five years service. Frank Griggs was elected vice-president; F. Burns, secretary; John Wostrel, treasurer, and Jos. Shearer. The company has about $300 in the treasury.

COLUMBIA CITY, IND.—The directors of the Home Telephone Company held a meeting at their offices on East Van Buren street, for the purpose of electing a new vice-president of the corporation, this being brought about owing to the death of the late George A. Pontius, who had held the place for the past ten years. Their selection for the place was Judge A. A. Adams of the appellate court, now located at Indianapolis. There was no argument relative to the ability of Judge Adams to fill this position as he held the office of treasurer with the above company for years, and did valiant service. To succeed Judge Adams as treasurer, Mrs. William Magley of this city was the unanimous choice of the directors.

DAVENPORT, IA.—The LeClaire Independent Telephone Company held their annual election of officers Monday evening. J. L. Brown was again chosen to act as president; F. E. Speer, vice-president; C. C. Hileman, secretary; J. L. Meyer, treasurer; director, Herman Dittmer.

DES MOINES, IA.—The three-day convention of the independent telephone men of Iowa closed at the Auditorium. The following officers were elected: Harold L. Beyer of Grinnell, president; Charles C. Deering of Des Moines, secretary-treas-

urer; J. C. Thorn of Fairfield, H. B. Shoemaker of Toledo, J. M. Plaster of Ft. Dodge and H. A. Kinney of Woodbine, executive committee. Next year's meeting will be held in Des Moines.

Forest City, Ill.—The stockholders of the Forest City Telephone Company held their regular annual meeting at Pemberton's Hall. W. L. Burbridge and Hubert Ingersoll of San Jose, whose term of office as directors expired, were re-elected for the ensuing three years. Mr. Burbridge, who, aside from being a stockholder, has been in the employ of the company for ten years as manager, has proven himself a loyal and efficient employe and was given a substantial raise in salary. A dividend of eight per cent was declared on all stock of record March 15, and ordered paid April 1. Officers for the ensuing year were elected as follows: President, E. L. Langston; vice-president, John Pemberton; secretary and treasurer, W. M. Cross. The board of directors is composed of the following members: P. S. Ingersoll, H. J. Kreiling, E. J. White, W. L. Burbridge and Hubert Ingersoll.

Grand Rapids, Mich.—At the meeting of the board of the Michigan Independent Telephone and Traffic association here, C. O. Trask of the Valley Home Telephone Company, Saginaw, was elected to fill the vacancy caused by the resignation of J. P. Gibbs of Ithaca.

Grand Rapids, Mich.—Charles F. Rood, E. B. Fisher, William J. Stuart and C. E. Tarte of the Citizens Telephone Company were re-elected to the directorate of the Battle Creek Company at the annual meeting, as were also R. M. Snyder, W. S. Keate and Lycurgus McCoy of Battle Creek and F. W. Clark of Battle Creek was added to the directorate. Mr. Fisher continues as president, Mr. McCoy as vice-president, Mr. Keate as treasurer and Mr. Tarte as secretary and general manager. The report showed a good year for the company with increase in the number of telephones.

Keystone, Ia.—At the regular meeting of the Keystone Telephone Company, which was held recently in Keystone, the following officers were elected: President, C. F. Tangeman; vice-president, C. A. Johnson; secretary, J. F. Feuerbach; treasurer, Henry Harder; trustees, John Zoring, Jr., C. H. Miller, and Julius Klappholz; switchboard representative, Ernest Harder; commercial line representative, Ernest Heckt, and wife chief, G. A. Seeck. The total membership of the company is sixty-eight. Four new members were added the past year. The report of the treasurer showed that the company had a balance of a little over $200. These funds will be used to improve and rebuild the lines.

Jeffersonville, Ia.—The Bremer-Black Hawk Telephone Company held its annual meeting and election in Woodmen hall. F. R. Decker was elected president and F[illegible]k Burkhart vice-president. Line directors are George Sevi[illegible] F. Gaston, F. R. Decker, M. Lane, F. Heidemann, [illegible] Hassman, Charles Matz, L. Ford, R. Howe, Ed Jenning[illegible] George Pepin.

Marshall, Ill.—The annual me[illegible]g of the Farmers' Mutual Telephone Company was held r[illegible]ntly and officers for the year were elected as follows: O. O. [illegible]abeneck, president; C. M. Buheck, manager, secretary and trea[illegible]er; William Fraker, Dan Neff and John Lederman, directors.

New Corydon, Ind.—The Farmers Mutual Telephone Company has elected F. Edward Kelley, president; Peter Boniface, vice-president; P. A. Houser, secretary, and Gustave Schindler, treasurer.

Portland, Ind.—At the meeting of the Farmers' Mutual Telephone Company of Wabash township, the following officers were elected: President, F. Edward Kelley; vice-president, Peter Bonifas; secretary, P. A. Houser; treasurer, Gustave Schindler. The election was conducted by the Australian ballot system. Only a few months ago both Kelley and Bonifas, just elected as president and vice-president, were arrested with eight others on charges of having tampered with the telephone company's lines. They were acquitted in the trial of the case in the circuit court.

Tampa, Fla.—The convention of the Florida Telephone Association came to an end with the election of officers. All the old officers were re-elected, as follows: President, W. G. Brorein, Tampa; vice-president, Dr. W. L. Moore, Tallahassee; secretary and treasurer, E. E. Voyle, Gainesville. The executive committee consists of the above officers and Ed Scott, of Arcadia; G. H. Fernald, of Sanford; G. C. Frissell, of Miami. A resolution was adopted asking the Railroad Commission to employ a competent and efficient telephone engineer for the state of Florida.

Wataga, Ill.—The annual meeting of the Wataga Farmers' Telephone Company was held at the town hall and an election of officers took place. S. R. Parkinson was elected to secretary's place and George Behringer was elected to the board of directors in John Suton's place. All other officers remain the same.

Willow Point, N. Y.—The stockholders of the Willow Point Telephone Company held their annual meeting at which the following directors were elected: Lee M. Winans, Stephen L. Noosbickle, Edward P. Razey, Charles M. Golden, Franklin Gates, Bernard F. O'Hara, James N. Allen. The officers elected were: Charles M. Golden, president; Stephen L. Noosbickle, vice-president; James N. Allen, secretary; Franklin Gates, treasurer. C. M. Golden was chosen superintendent and general manager.

Woodhull, Ill.—The annual meeting of the Woodhull Switchboard Association was held in the town hall and was attended by all the directors who comprised the presidents of the various lines centering here. The expenses of the year amounted to over $1,400. The switching fee was placed at the same figure as last year, namely $250 per year, which makes the cost of telephone service lower around here than in most places of this size. The election of officers resulted in the selection of the same officials. They are: President, L. J. Stiers; vice-president, W. L. Stitt; secretary, E. N. Stephenson; treasurer, Frank Swanson; troubleman, W. P. Kirkland; purchasing committee, W. P. Kirkland and L. J. Stiers.

Yorktown, Ia.—At the last meeting of the Yorktown and Norwich Telephone Company, the following officers were elected: President, Harry Copeland; secretary, Fred Sump; treasurer, Jim Stoop; lineman, Fred Apple; residence at Norwick, B. Miller; residence at Yorktown, Bob Loy.

Hager City, Minn.—That the Hager City Telephone Company is in a flourishing condition was revealed at the annual meeting held at Hager City. Officers for the year were elected and other important business transacted. The business of the company has grown to such proportions that it was found necessary to incorporate. The company has hitherto been conducted as a mutual concern. The capital stock of the new corporation will be $12,000. The following officers were elected: President, A. F. Andersen; vice-president, Pat Campbell; secretary, M. C. Nelson; treasurer, J. H. Sharp; manager, J. H. Pumplin.

Alma, Mich.—The annual meeting of the stockholders of the Union Telephone Company was held recently in Alma, Mich. Sixty-three thousand of the 85,000 shares of the stock being represented. The report of the secretary, L. L. Conn, of Owosso, showed that the past year has been a successful one and that the present year has bright prospects. C. T. Babcock of St. Johns was elected president to succeed himself; E. S. Wager of Edmore was elected vice-president; L. L. Conn of Owosso, secretary; E. O. Dewey, Owosso, treasurer, and W. J. Melchers, Owosso, assistant secretary and general manager. The following directors were chosen: C. T. Babcock, St. Johns; E. S. Wager, Edmore; J. H. Fildew, St. Johns; F. G. Thiers, Mt. Pleasant; E. O. Dewey, Owosso; W. A. Bahlke, Alma; J. E. Gerow, Ovid; Tod Kincaid, Marmonsville, Ohio; J. T. Millman, St. Johns; J. H. Whitney, St. Louis; A. M. Bentley, Owosso; J. B. Crawford, Ithaca.

Keyser, W. Va.—The Mineral County Mutual Telephone Company held a meeting and elected as directors, H. S. Thompson, S. N. Moore, C. W. Siever, George Wagoner, Zed Dawson, H. L. Welch and I. C. McDonald. The officers elected are H. L. Welch, president; S. N. Moore, vice-president; C. W. Siever, secretary; George Wagoner, treasurer; Jas. Arnold, general manager. The Mutual system in this county is putting in several miles of county line to connect Keyser with Elk Garden by another route that will give service to some fruitmen west of Keyser, on the mountain.

MISCELLANEOUS.

Harrisburg, Pa.—Nearly 68,000 shares of American Union and subsidiary telephone companies were sold at public sale here recently under orders of the Federal court. William B. Given, of Chicago, made the largest bid, offering $141,000 for the lot. The shares were sold in lots of from 500 to 5,000 to various attorneys.

Harlingen, Tex.—Harlingen's increasing population and business interests has warranted the Southwestern Telegraph and Telephone Company in installing an all-night service, which went into effect February 1.

Galesburg, Ill.—The Mutual Union Telephone Exchange, operated in this city, was disposed of to C. B. Cheadle of Joliet and E. S. Steerett of Henry. The controlling interest held by Manager L. E. Cutler was sold to these men, hence they will have the managing of the company. The purchasers own other exchanges in Illinois and they are well acquainted with the telephone business. The Mutual Union Company was incorporated for $40,000, having started in this city with six phones in 1900.